

Collins

Key Stage 3

Geographical Enquiry

Teacher Book 3

**David Weatherly
Nicholas Sheehan
Rebecca Kitchen**



William Collins' dream of knowledge for all began with the publication of his first book in 1819. A self-educated mill worker, he not only enriched millions of lives, but also founded a flourishing publishing house. Today, staying true to this spirit, Collins books are packed with inspiration, innovation and practical expertise. They place you at the centre of a world of possibility and give you exactly what you need to explore it.

Collins. Freedom to teach

Published by Collins
An imprint of HarperCollinsPublishers Ltd
Westerhill Road
Bishopbriggs
Glasgow G64 2QT
www.harpercollins.co.uk

Collins® is a registered trademark of HarperCollinsPublishers Ltd

Browse the complete Collins catalogue at
www.collinseducation.com

First edition 2015

© HarperCollins Publishers Limited 2015

Maps © Collins Bartholomew Ltd 2015

10 9 8 7 6 5 4 3 2 1

ISBN 978-0-00-741119-1

David Weatherly, Nicholas Sheehan and Rebecca Kitchen assert their moral rights to be identified as the authors of this work.

All rights reserved. No part of this publication may be reproduced, stored in a retrieval system, or transmitted, in any form or by any means, electronic, mechanical, photocopying, recording or otherwise without the prior permission in writing of the publisher and copyright owners.

The contents of this publication are believed correct at the time of printing. Nevertheless the publisher can accept no responsibility for errors or omissions, changes in the detail given or for any expense or loss thereby caused.

HarperCollins does not warrant that any website mentioned in this title will be provided uninterrupted, that any website will be error free, that defects will be corrected, or that the website or the server that makes it available are free of viruses or bugs. For full terms and conditions please refer to the site terms provided on the website.

A catalogue record for this book is available from the British Library

Typeset and designed by Mark Walker Design

Cover and title page designs by Angela English

Printed and bound by RR Donnelley at Glasgow, UK

Most of the mapping in this publication is generated from Collins Bartholomew digital databases.

Collins Bartholomew, the UK's leading independent geographical information supplier, can provide a digital, custom, and premium mapping service to a variety of markets.

For further information:

Tel: +44 (0)208 307 4515

e-mail: collinsbartholomew@harpercollins.co.uk

Visit our websites at: www.collins.co.uk or www.collinsbartholomew.com

Acknowledgments:

The publishers wish to thank the following for permission to reproduce photographs, illustrations and other graphics. Every effort has been made to trace copyright holders and to obtain permission for the use of copyright materials. The publishers will gladly receive any information enabling them to rectify any error or omission at the first opportunity.

p20, p21 © The Ocean Cleanup; p34 © KUCO/Shutterstock.com; p64 © Google Earth 2015

Contents

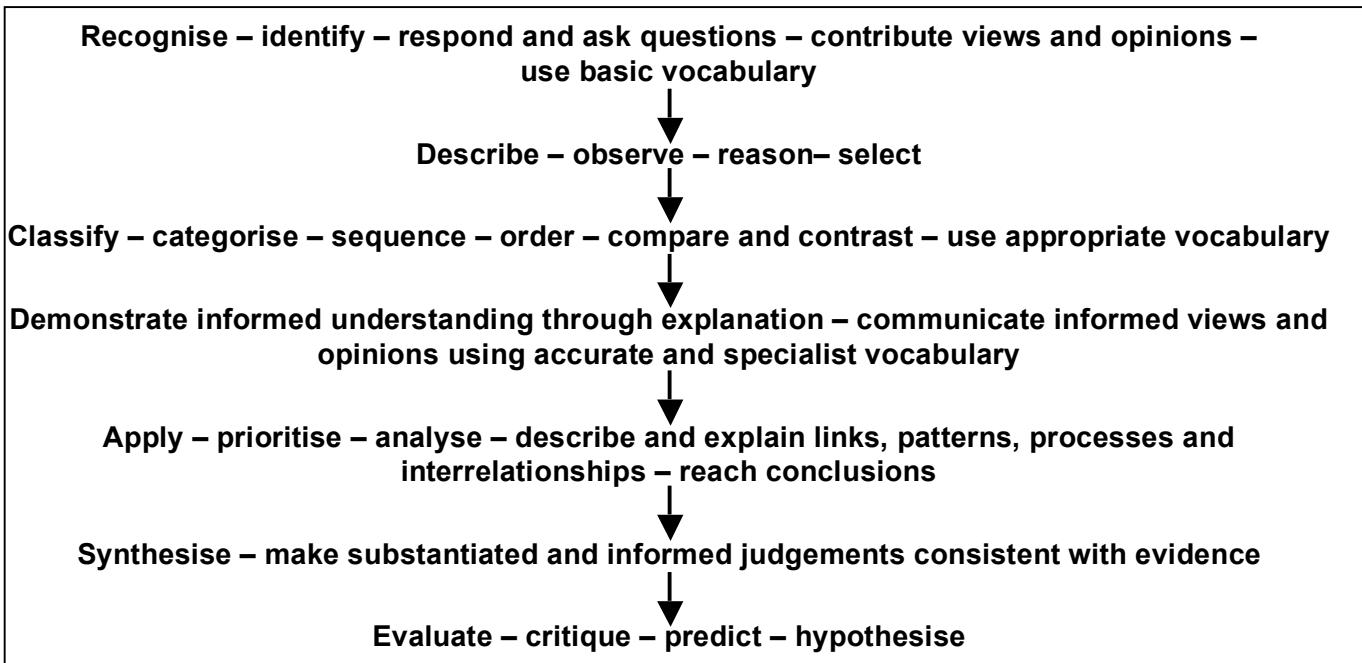
Introduction	4
Enquiry 1: ‘Middle’ – of what? ‘East’ – of where?	6
Is the Middle East a region?	
Enquiry 2: Issues in the oceans	13
Is our use of ocean resources sustainable?	
Enquiry 3: Going boldly	23
Is India’s space programme justified?	
Enquiry 4: From Shangombo to South Tavy Head	35
Why are Thandi and Moses working in Soweto market?	
Enquiry 5: Using someone else’s water	46
How does water consumption create interdependence and conflict?	
Enquiry 6: Biodiversity under threat	56
Can economic development on Borneo be sustainable?	
Blank outline maps	66

KS3 Geographical Enquiry

This *Geographical Enquiry* programme offers you a new and exciting approach to engaging your Key Stage 3 students with twenty-first century geography. It is the antithesis of the traditional textbook based ‘double-page spread’ method of teaching geography, which too often offers students only a superficial and disjointed perspective of the subject. In contrast, the approach taken in this programme is to connect students with wide-ranging and stimulating geographical questions and associated data that enable them to consider the subject in greater depth. This series gives students the opportunity to see the world as geographers and enables them to achieve and perform highly through carefully planned progression and challenge.

The following five principles have guided the design and structure of each enquiry:

- 1 Understanding the importance of geography as a discipline that enables students to recognise, describe, explain and evaluate the interactions between people and environments and acknowledging the central role geography plays in supporting these students to become ‘agents of change’.
- 2 Recognising what it means to get better at geography in terms of intellectual outcomes and building progression in these skills. Excelling as a ‘geographer’ as opposed to just being ‘good at geography’ requires not only knowing and understanding the physical and human processes which shape the world in which we live, but also being challenged to apply that knowledge and understanding to new situations and to think both conceptually and critically. The following progression in geographical outcomes underlies each of the enquiries:

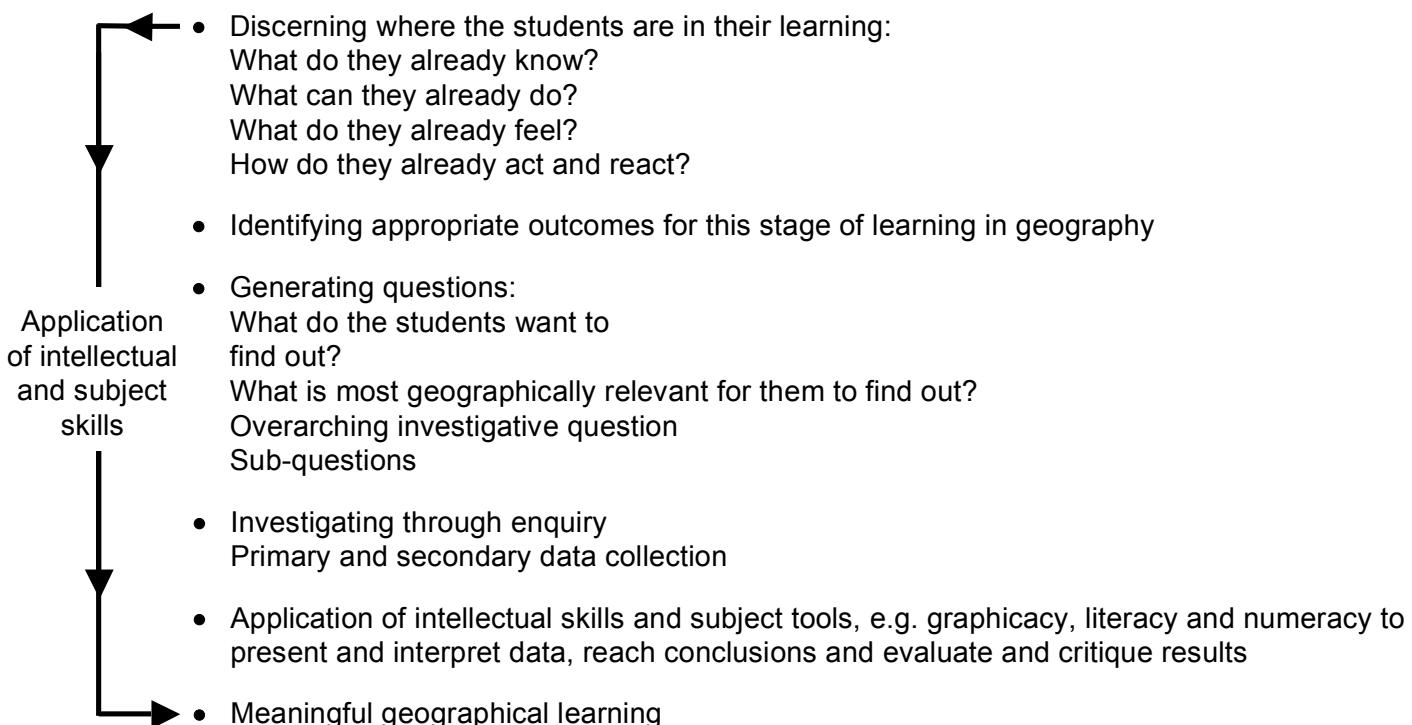


- 3 Not confusing subject ‘outputs’ with subject ‘outcomes’. Each of the enquiries has a suggested output of learning such as a PowerPoint presentation, the design of a website home page, a piece of persuasive writing or physical model. These outputs are not ends in themselves but vehicles for demonstrating geographical outcomes. Their value lies in what they indicate about the breadth and depth of geographical learning which has taken place, e.g. to be able to evaluate the viewpoints of different stakeholders regarding a contentious issue. Such an approach makes assessment more straightforward – in this example, is there evidence of both appraisal of different perspectives and a judgement?
- 4 Ensuring and supporting engagement through thinking very hard about the modern geographical issues, places, themes and interactions that are of most relevance to young geographers today. Every enquiry has been informed by the subject content and recommendations of the 2014 National Curriculum in the

mastering of locational and place knowledge and the areas of study recommended for both human and physical geography. Comprehensive cross-referencing with the subject content of the Key Stage 3 programmes of study are detailed separately in the relevant section for each enquiry of this book, which also includes the supporting learning resources referred to in the Student Book. Each enquiry is made up of one overarching investigative question and a series of sub-questions serving to structure learning and provide both continuity and progression. This ensures that students gain crucial subject knowledge and understanding of the topics and relationships that lie at the heart of modern twenty-first century geography.

5 Making structured enquiry with plenty of opportunities to *consolidate your thinking* and *apply your skills* the driver for developing learning and reflection. Each of the enquiries has been designed to balance the need to provide the student with the key information required to progress through the enquiry along with the need to encourage the learner to ask as many questions themselves as possible.

Key question led enquiry based learning



In addition to the wide-ranging learning support materials in this Teacher Book further resources are also available to download from www.collins.co.uk/KS3Geogtr3.

These resources consolidate and extend student learning and have been created both to ensure that teachers possess detailed contextual information for each enquiry and also to provide ideas and spark interest in pursuing related investigations.

Downloadable resources include:

- Engaging and inspiring **Story Maps** for each enquiry which cover the basic geographical concepts that students will encounter in the Student Book.
- Extensive **image galleries** related to each investigation.
- **Word and PDF files** of the Teacher Book that enable teachers to either use the enquiry plans directly or adapt them according to the needs of individual students and groups.

The overriding principle, which has guided the design and structure of the enquiries and learning resources in this series, has been to support and encourage students to see the world through the eyes of geographers, not geography students. We are confident that students will recognise both the relevancy of investigating the modern world they live in and the value of the enquiry method of teaching which prepares them for adult life, encourages high achievement and supports further learning.

Is the Middle East a region?

► Purpose ◀

This investigation is designed to engage pupils in some difficult questions regarding the defining of regions and the naming of places. Pupils begin this enquiry by investigating the origins of the term 'Middle East', tracing it back to British colonial roots in the 1850s. The term is then brought up-to-date by considering the Bush administration's definition of the 'Greater Middle East' in 2004, and its links to the Muslim world. Pupils are asked to consider why the people living in the Middle East don't label it as such and how places are named different things by different people. The worksheet 'Labelling places' will help them to unpick some of these ideas in more detail.

The pupils then move on to locate the Middle East. The atlas that they look at and their definition will influence which areas are included in the 'Middle East' region. This part of the enquiry highlights the power of cartographers as they attempt to draw accurate maps. However, cartography is so bound up with territory (which is frequently disputed and contested) that their job is particularly challenging. The next part of the enquiry turns its attention to how and why geographers define regions and how this fits with the history of geography. The definition of a region as 'an area which has similar characteristics which make it unique' is put forward and suggestions are made as to what these characteristics might include. Pupils are encouraged to complete a data sheet for the countries included in the Middle East, to see whether or not there are clear similarities between them. The learning activity 'The history of geography' puts regional geography into context. It was a main phase in geographical thinking in the 1930s and 1940s, when terms such as 'Middle East' were coming to prominence, but has declined in recent years. Pupils are encouraged to suggest whether grouping countries together as 'regions' is a relevant and useful idea in modern geography. Whilst this is a difficult task, pupils can draw upon information in the timeline, particularly the criticisms of regional geography by geographers in the quantitative revolution, to get them started. For the main assessment task, pupils are asked to create a composite map of two or more of the maps in the Student Book.

Whilst it is worth showing pupils some examples of composite maps (http://www.edwardtufte.com/bboard/q-and-a-fetch-msg?msg_id=00018S is a good starting point), pupils should be given freedom to come up with their own key and ideas. They will find this difficult – and from a teacher perspective it can be quite painful – but if you allow them to try out or draft their ideas before creating their finished map, they may be more willing to experiment. We wanted the focus of this enquiry to question the very idea of the Middle East as a region without dwelling on one of the issues – oil – that it has become synonymous with. However, we also appreciate that this topic is central in the shaping of the area as a region, and so this topic is investigated in an extension to the initial enquiry. There are a number of additional sources of information for the pupils to read which will enable them to gain a more in-depth understanding of this issue. Pupils are encouraged to consolidate their thinking about the oil industry by creating a factfile that highlights the impact that oil has had on the region. Finally, they are asked to read the articles about Middle East oil and to reflect on whether this additional information strengthens or weakens the argument for calling the Middle East a region.

► Aims ◀

Through this enquiry, pupils will be challenged and supported to:

- Develop contextual knowledge of the location of globally significant places, including their defining physical and human geographical characteristics, and how these provide a geographical context for understanding the actions of geographical processes.
- Understand the processes that give rise to key physical and human features of the world, how these are interdependent and how they bring about spatial variation and change over time.
- Interpret a range of sources of geographical information to reach substantiated conclusions and judgements consistent with the evidence and communicate these in a variety of ways, including through maps, numerical and quantitative skills, writing and presenting.

► Links to Key Stage 3 subject content ◀

Pupils should be taught to:

Locational knowledge

- Extend their locational knowledge and deepen their spatial awareness of the world's countries using maps of the world to focus on the Middle East, focusing on its environmental regions, key physical and human characteristics and countries.

Geographical skills and fieldwork

- Build on their knowledge of globes, maps and atlases and apply and develop this knowledge routinely in the classroom.
- Draw conclusions from geographical data, using multiple sources of increasingly complex information.

► Possible assessable outcomes ◀

- The creation of a composite map to illustrate the similarities and differences between the countries which make up the Middle East. This then forms the basis of a discussion as to whether or not the Middle East can be defined as a region.

We take places for granted. We use their names without really thinking about why they are so called and who has done the naming. This help sheet explores the origins and controversies of naming places.

Explorers and their names

There are many examples of places being named after the explorers who ‘discovered’ them. The Australian island of Tasmania was originally named ‘Anthony van Diemen’s land’ in 1642 by Abel Tasman, the Dutch explorer, who wanted to please his sponsor. For a while it was shortened to ‘van Diemen’s land’ before being renamed ‘Tasmania’ in 1856.

Chomolungma

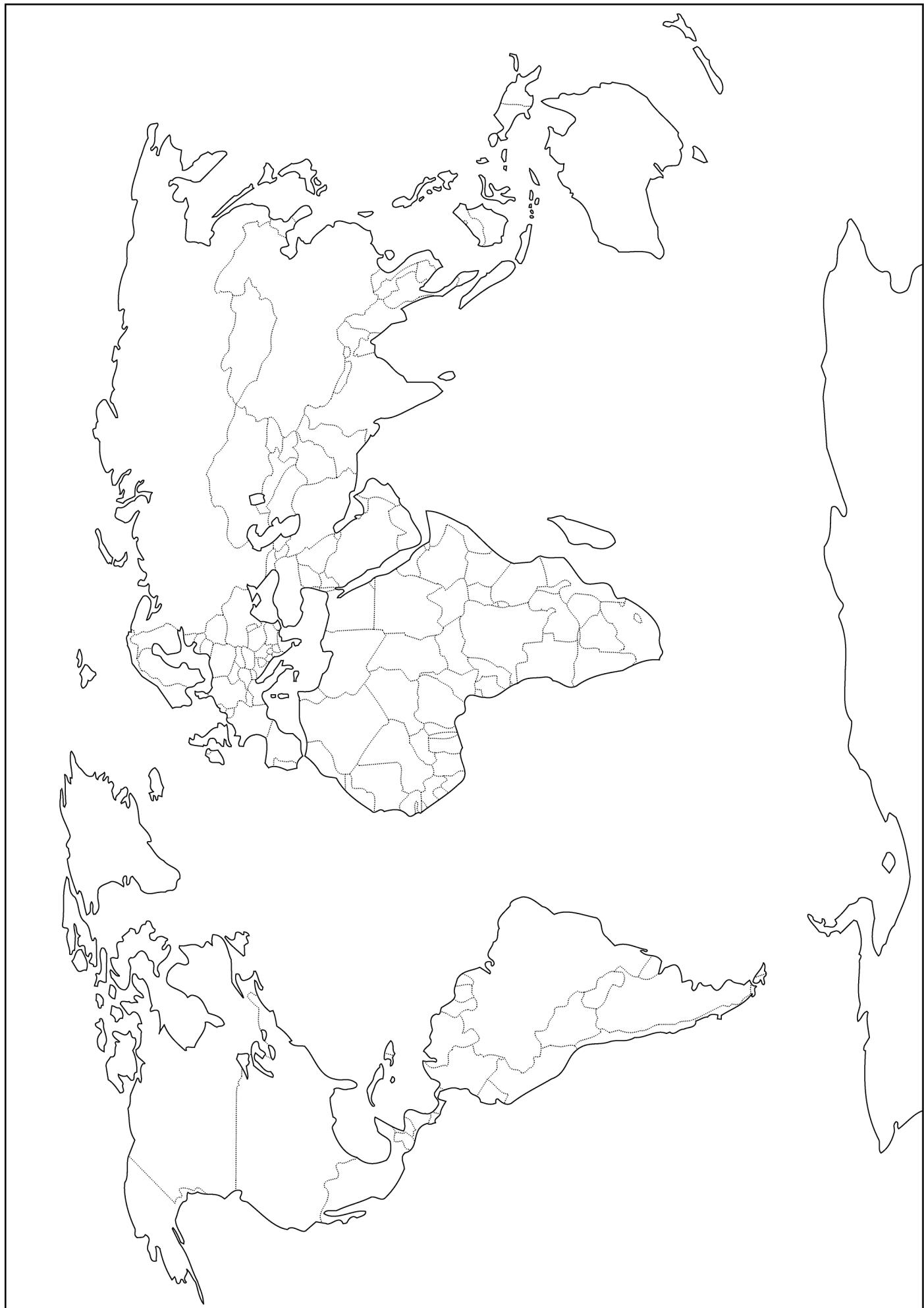
Have you heard of Chomolungma? No? What about Mount Everest? In 1865, the Royal Geographical Society asked Andrew Waugh (who was Surveyor General of India at the time and in charge of measuring the height of mountains in the area) what the newly measured highest mountain in the world should be called. He originally wanted to choose a local name but the borders of Tibet and Nepal were closed to foreigners at the time, and so there was no opportunity to ask the locals. He decided instead to name it after his predecessor, Sir George Everest. Today it is called Chomolungma, which means ‘Holy Mother’, by the Tibetans, and Sagarmatha by the Nepalese, as well as Mount Everest.

Myanmar or Burma?

The official name of the country nestled between Bangladesh and Thailand is Myanmar; this is the name that the UN and countries such as France and Japan recognise and use. However, in the UK and the United States the country is still referred to as Burma, even though it officially changed its name in 1989. This is because the name was changed by the military junta, a regime that the UK government didn’t agree with. Today, news organisations such as the BBC still call the country Burma, as they believe that this is the name which their viewers will recognise.

With all these examples there are controversies about who should do the labelling. Should it be the local people, the local government, the UN or people who have ‘discovered’ the place? Does it matter if places have different names depending on who is doing the naming?

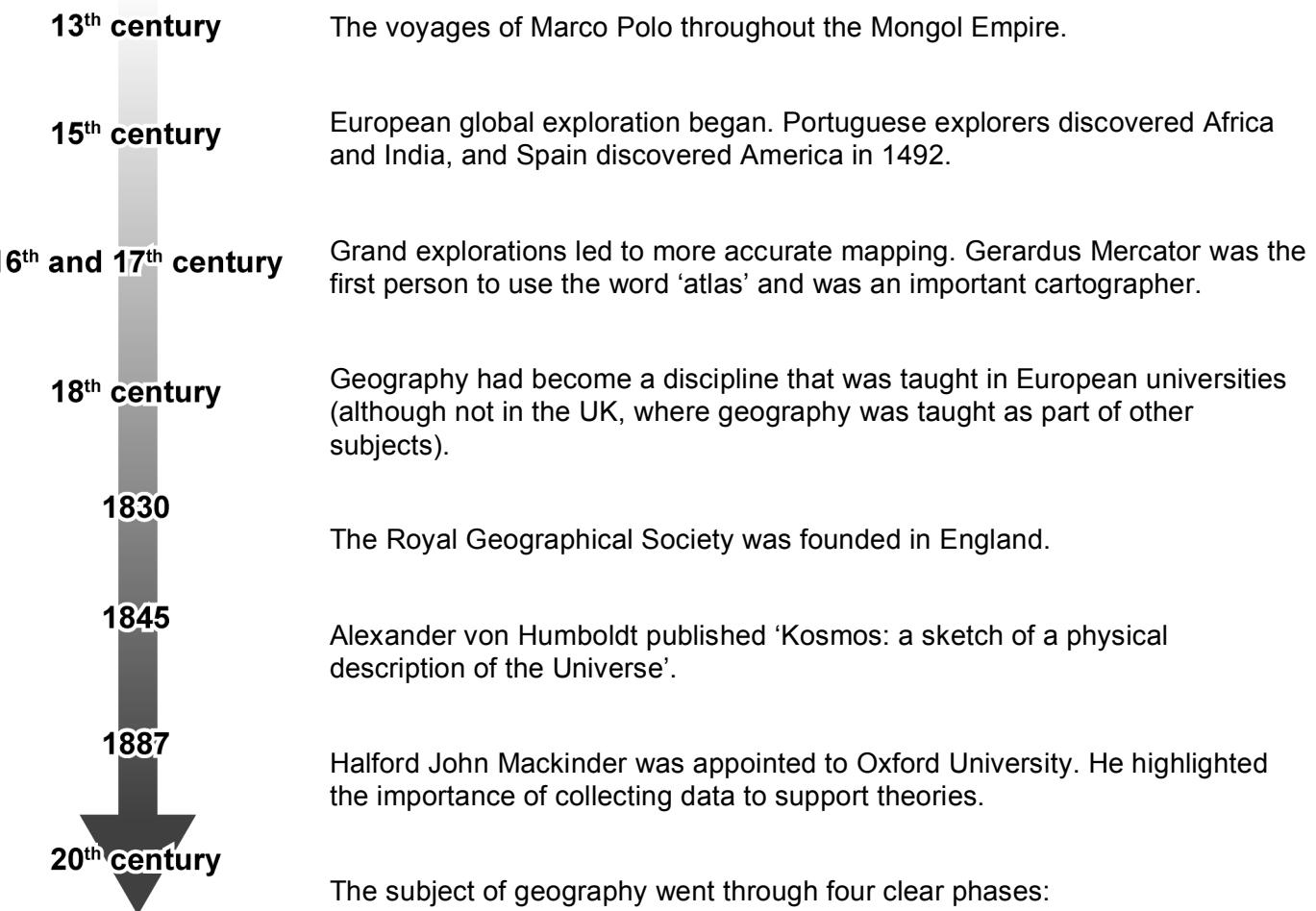
On the blank map of the world can you locate the examples in the text above? Annotate your map to explain the origins or controversies of the names. Can you find out any other places that have disputed or different names? Locate and annotate these on your map.



Using the CIA World Factbook <https://www.cia.gov/library/publications/the-world-factbook/> complete the data sheet below for the countries of the Middle East. Two columns have been left blank for you to choose your own categories to investigate.

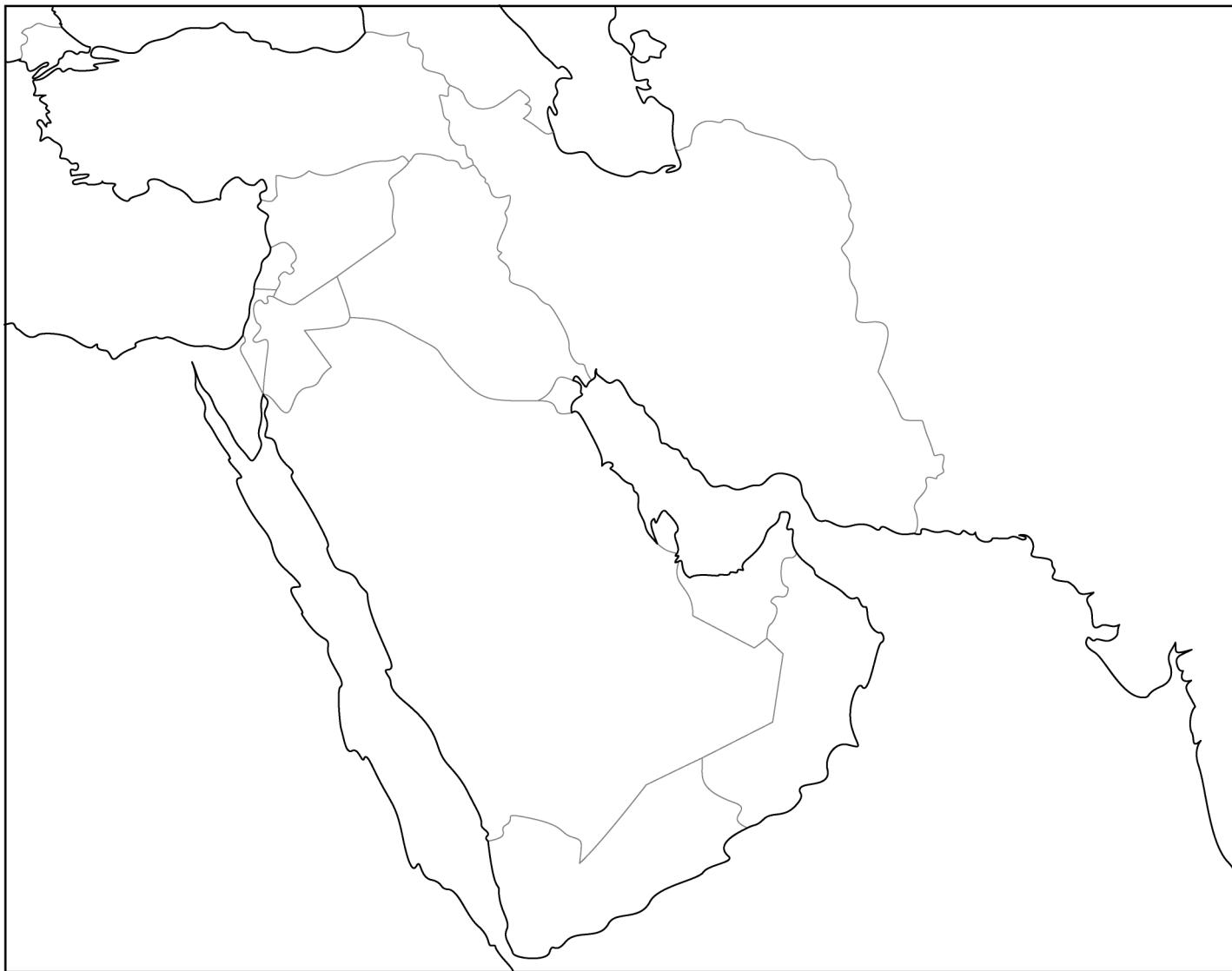
Country	Population density	Religion (majority)	Population growth rate	Life expectancy	Literacy rate	GDP per capita	Military spending
Turkey							
Bahrain							
Kuwait							
Oman							
Qatar							
Saudi Arabia							
U.A.E.							
Yemen							
Cyprus							
Egypt							
Iran							
Iraq							
Jordan							
Lebanon							
Israel							
Syria							

The history of geography is an interesting one, which began long before the exploration of the globe in the 16th and 17th centuries. Indeed, Eratosthenes was the first to use the term ‘Geography’ in around 200 BC! Look at the timeline below, which traces the more modern phases of the subject.



- 1 Environmental determinism – this theory suggests that people’s behaviour is due to the natural environment. For example, one theory was that ‘heat in tropical areas makes people lazy’. This went out of favour in the 1930s, as there was little evidence to support it and it was seen as a sweeping generalisation.
- 2 Regional geography – this phase highlighted the importance of studying place in geography. Regional geographers collected data to describe regions and also tried to split the world into regions that had similar characteristics. Whilst its influence declined in the 1950s, partly because it was criticised as being too descriptive, it is still taught in some major universities today.
- 3 Quantitative revolution – this phase began in the 1950s and took geography in a more scientific direction. Geographers during this period came up with theories and then applied statistical tests to them.
- 4 Critical geography – this phase started in the 1970s and was a direct challenge to the scientific quantitative revolution that had gone before. Critical geography was much more qualitative and looked at the world from different perspectives, such as the Marxist and feminist perspectives.

Why do you think geographers are less interested in regions today than the geographers of the 1950s were?



- 1 Using an atlas, label the countries shown on the map above.
- 2 Have a look at the maps of the Middle East in the Student Book. Pick at least two of these (you can pick more but this will make your task more complicated) and create a composite map. This is a map which is a mixture of the two (or more) maps you have chosen. You can use different colours and icons to help you. Don't forget that your map will need a title and a key.
- 3 Describe the pattern shown on your composite map.
- 4 A region is defined as '*An area of the earth's surface with one or more similar characteristics that makes it unique.*' Using your composite map and the maps in the Student Book, do you think that the Middle East should be defined as a region? Explain your answer.

Is our use of ocean resources sustainable?

► Purpose ◀

The purpose of this enquiry is to examine human use and its impact upon the world's oceans. The enquiry allows pupils to consider the range of different impacts before focusing on two specific issues – plastic pollution and overfishing. Pupils will develop knowledge and understanding of ocean currents, oceanography, recycling and industrial fishing, whilst considering whether our use of ocean resources is sustainable. It is key to this enquiry that pupils are given the opportunity to develop their values, attitudes and understanding of interdependence.

The enquiry begins by examining our blue planet from a Pacific perspective – where the entire view is dominated by the Pacific Ocean and almost no land is visible. Pupils are asked to draw upon their prior knowledge and understanding by creating a spider diagram on the framework provided, around the theme '*How do humans use and impact the oceans?*' Pupils should then classify these into different categories.

Having established the diverse range of uses of and impacts on the oceans that humans are having, the enquiry then moves on to the first key question. This focuses on the story of Tracey Williams from Cornwall, UK. She has been promoting awareness of ocean pollution by collating stories of flotsam and jetsam washed up on local beaches – particularly and unusually, pieces of marine-themed Lego. She has set up a Facebook page '*Lego lost at sea*', where individuals finding Lego on beaches can report their discoveries. The big question is, of course, why is this happening? Pupils are encouraged to examine a range of maps, images and information to build up a plausible explanation. The answer is related to a marine accident in 1997, when a freak wave caused a container ship to lose over sixty containers in the sea. One of these contained thousands of marine-themed Lego boxes, and the pieces are still washing up today in almost pristine condition. Some unconfirmed reports suggest pieces have been found in Florida.

The movement of debris in the oceans, as illustrated by the Lego, is intriguing and the study of this has led to the creation of accurate maps of the ocean currents. The study of flotsametrics was developed by oceanographer Dr Curt Ebbesmeyer. Pupils are introduced to him and his story before being asked to produce their own map of ocean currents, as mapped out by the movement of debris.

Much of the debris being discovered is plastic-based and this presents a crisis for the oceans. Not only are container ships losing materials in big storms, but human activity and waste is leading to ever-increasing amounts of plastic waste entering the oceans. In Question 2.2, pupils are asked to examine this issue using the resources provided. They are asked to investigate the great 'garbage patches' – accumulations of plastic caught in gyres in the Pacific and Atlantic Oceans – and the impact these are having on marine life. Pupils will need to research this further before synthesising the information and presenting it in the form of a simple booklet for younger children. Further guidance for this task is provided on page 18. It is important that their work focuses on causes, effects and possible solutions to the problem in the form of prevention (such as reduce, re-use and recycle) and cure (cleaning up the oceans). The pupils are challenged to see how they can make a difference by developing their own innovative products that re-use as many plastics as possible. Guidance on the different types of plastic is provided.

In the final key question, Question 2.4, pupils are challenged to investigate 'Where have all the fish gone?' Marine ecosystems are threatened by pollution and plastic waste, and recent reports have highlighted dramatic declines in species diversity. However, part of this decline can also be related to overfishing and bycatch by industrial fishing practices. Pupils are asked to consider the resources and their own research using the links provided, to investigate one of the marine species under threat and any sustainable solutions to this problem.

► Aims ◀

Through this enquiry, pupils will be challenged and supported to:

- Develop contextual knowledge of the location of globally significant places, including their defining physical and human geographical characteristics, and how these provide a geographical context for understanding the actions of geographical processes.
- Understand the processes that give rise to key physical and human features of the world, how these are interdependent and how they bring about spatial variation and change over time.
- Interpret a range of sources of geographical information about physical and human processes.

► Links to Key Stage 3 subject content ◀

Pupils should be taught to:

Human and physical geography

- Understand through the use of detailed place-based exemplars at a variety of scales the key processes in physical geography relating to economic activity and the use of natural resources.
- Understand how human and physical processes interact to influence and change landscapes, environments and the climate, and how human activity relies on effective functioning of natural systems.

Geographical skills and fieldwork

- Build on their knowledge of globes, maps and atlases and apply and develop this knowledge routinely in the classroom.
- Interpret topographical and thematic mapping, and aerial and satellite photographs.

► Possible assessable outcomes ◀

- The information booklet requires pupils to research key elements of this enquiry and to draw together their work on ocean currents and oceanography, plastic waste accumulations, the impact this is having on marine ecosystems and the range of solutions. The ability to represent this information to a younger audience is key, as well as the ability to suggest meaningful action points to make a difference.

Develop your own ideas and then share these with a partner. Keep pairing and sharing until you have up to fifteen uses and impacts. Try to classify these using colours. Fill in the key to help you.

How do humans use and impact the oceans?

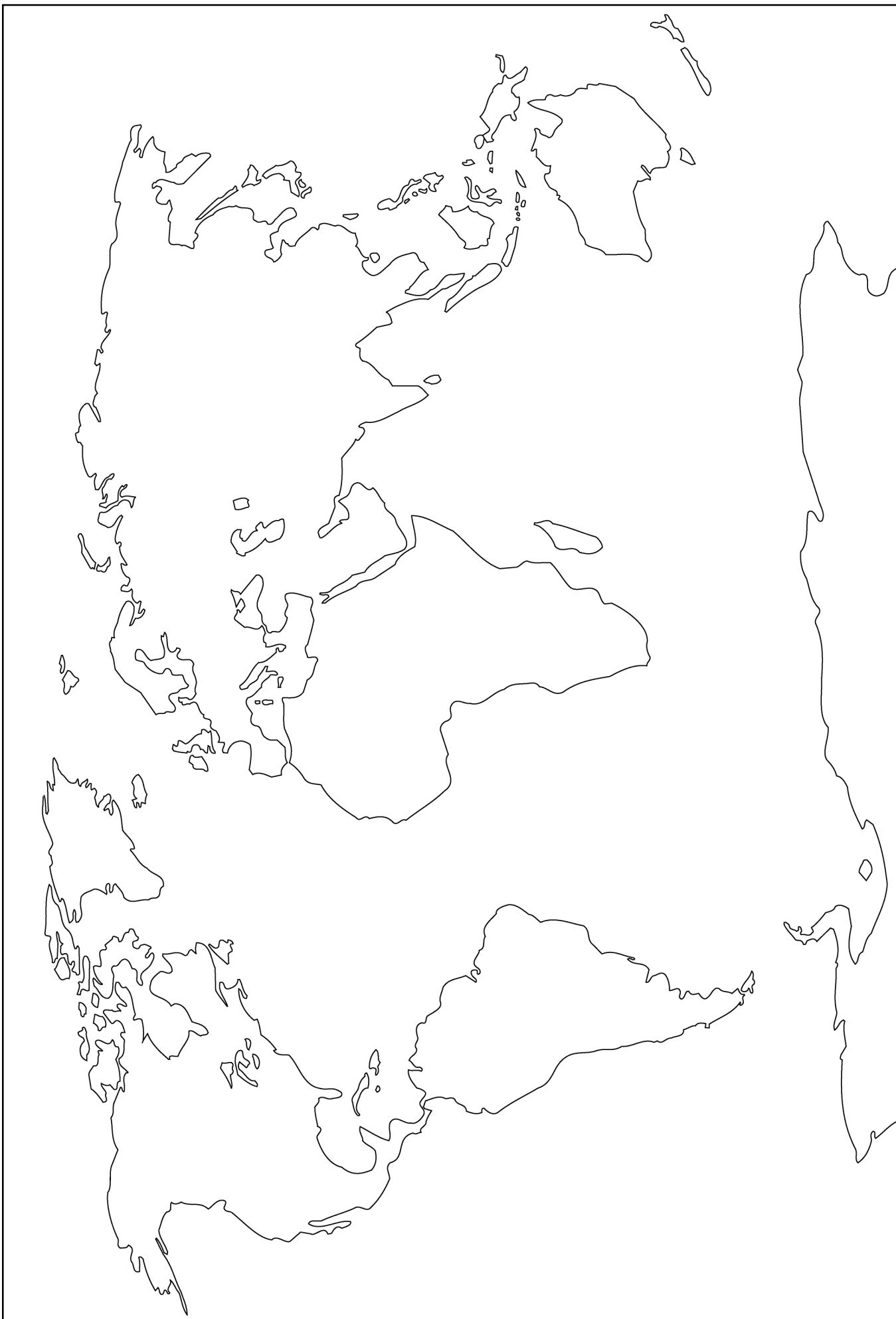
Key:

Why is Lego washing up in the southwest of England?

Annotate the blank map of Southwest England below, using the resources on page 24–27 to help you, to suggest reasons why Tracey and others are finding Lego on the beach.



Use the ocean current map to create your own, labelled map of the world's oceans and currents.



December 2014 Press release:

The NOAA Marine Debris Program (MDP) supports US and international efforts to research, prevent, and reduce the impacts of marine debris. One of the biggest threats to our oceans is the build up of garbage and plastic, which is damaging sea life and marine ecosystems around the globe. In a speech today, our Marine Debris Director, Nancy Wallace, stated:

"Our job is to raise awareness of this issue and to educate people that the everyday items they use can end up in the oceans. We have to be responsible for these items and share with people what they can do to help solve the problem."

Your Task:

The NOAA Marine Debris Programme education officer wants your help to raise awareness of the issues surrounding plastic waste in the oceans with younger pupils. They would like you to produce a **booklet or storybook for primary school children (age 6–8)** to give them **basic facts, figures and information** about the issue, including the sources, the effects on the environment and both land-based and ocean-based solutions. Ensure they are left with a clear idea of what they can do to help. You will need to think very carefully about the words you use and how you present information. Try to use **colourful pictures, slogans and even a character if you feel it is appropriate.**

Success criteria	
1	Produce an A4 information booklet or a storybook aimed at primary school children that raises awareness of the causes, effects and solutions to the issue of plastic waste in the oceans.
2	Include clear information on why there is a need to address this issue.
3	Include clear sections on the causes, effects and possible solutions. Ensure that you refer to solutions at source and possible methods to clean up the waste.
4	Make sure your booklet is colourful and easy to read.
5	Use a variety of sources of information such as: Enquiry 2 Student Book pages Enquiry 2 Teacher Book pages http://www.algalita.org/research/gis-mapping/ http://www.algalita.org/videos/videos/ http://marinedebris.noaa.gov/ http://theplastiki.com/ http://junkraft.org/ http://5gyres.org/ http://www.theoceancleanup.com/

The Great Pacific Garbage Patch

The area

The patch is around 1,760,000 kilometres squared. It is around seven times the size of the United Kingdom.



How is it formed?

Currents in the Pacific Ocean create a circular effect that pulls debris from North America, Asia and the Hawaiian Islands. They then push the debris into a floating pile containing 100 million tons of rubbish.



Photodegradation

400 years
Six-pack plastic ring



450 years
Plastic bottle

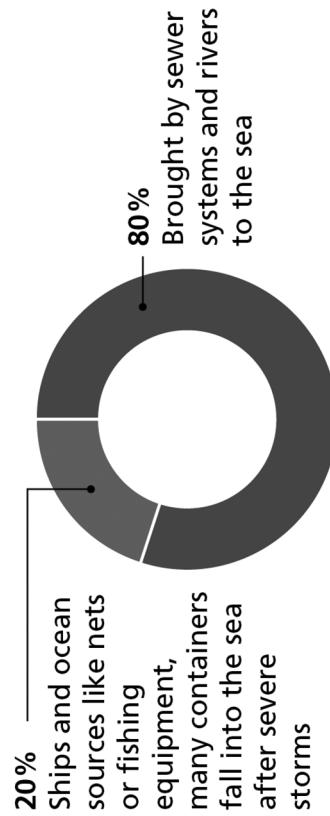


FACT



Only 6.5% of plastic is recycled every year in the USA

Where does all the rubbish come from?



Plastic problems

- Plastic fouls beaches worldwide and puts off tourists
- Some plastics entangle and kill marine animals
- Washed up plastic destroys the habitats of coastal animals
- Plastic gets inside ships' propellers and keels, making ship maintenance more expensive
- Plastics are ideal vessels and enable invasive species to travel to further regions
- Most plastic never biodegrades, it takes hundreds of years to break down into smaller pieces, which are still plastic

WHAT WE KNOW ABOUT THE "GARBAGE PATCHES"



PACIFIC OCEAN "GARBAGE PATCHES"

"Garbage patches" – Inaccurate nickname given to open ocean areas where marine debris concentrates.

What's in a name? - The name "garbage patch" is a misnomer. There is no island of trash forming in the middle of the ocean nor a blanket of trash that can be seen with satellite or aerial photographs. This is likely because much of the debris found here is small bits of floating plastic not easily seen from a boat.

Eastern garbage patch - Concentrations of marine debris have been noted in an area midway between Hawai'i and California known as the North Pacific Subtropical High or the "eastern garbage patch." The High is not a stationary area, but one that rotates, moves, and changes.

Western garbage patch - Another area of marine debris concentration is located off the coast of Japan, and researchers believe it to be a small recirculation gyre (ocean feature made up of currents that spiral around a central point) likely created by winds and ocean eddies.

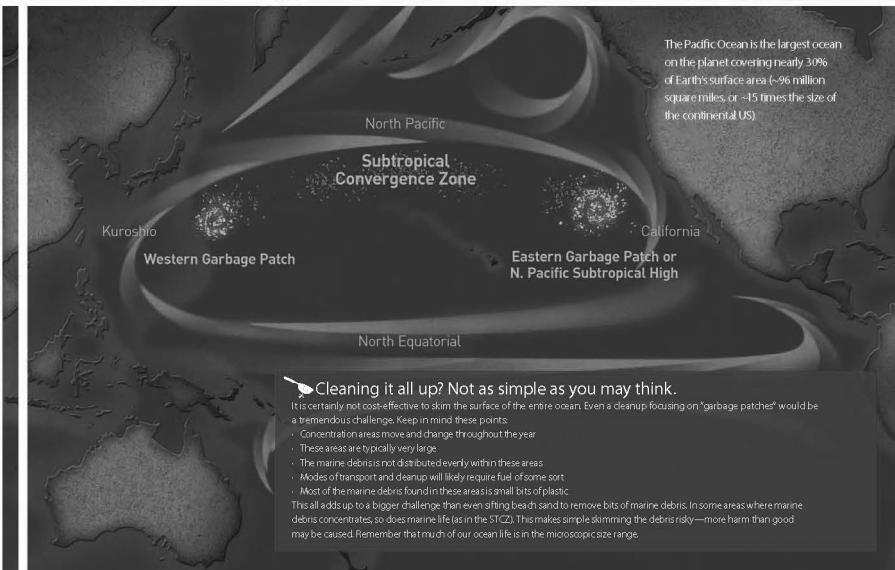
OTHER AREAS? OTHER OCEANS?

The "patches" are not the only open ocean areas where marine debris is concentrated. Another important area is the North Pacific is the Subtropical Convergence Zone (STCZ). This area, located north of the Hawaiian archipelago, has a high abundance of marine life, is a known area of marine debris concentration, and is one of the mechanisms for accumulation of debris in the Hawaiian Islands (Pichel et al., 2007).

Oceanographic features similar to the North Pacific Subtropical High and STCZ exist in other oceans of the world. Little research to date has been conducted on marine debris in these areas. Because of this no one can say for sure how large these areas are, especially since they move and change, sometimes daily, and no accurate estimate exists of how much debris is out there.

Regardless of the exact size, mass, and location of these areas of concentration, man-made litter and debris do not belong in our oceans or waterways.

For more information & details please visit www.MarineDebris.noaa.gov/info/patch.html



"GARBAGE PATCH" RECIPE

- Floatable marine debris from land- and ocean-based sources (e.g., tiny pieces of plastic)
- Ocean and atmospheric conditions suitable for the concentration of marine debris (e.g., waters rotating—large or small area, fast or slow rotation—in a cyclone-like fashion)



Debris collected in a trawl of nearly 1000 km² in the North Pacific. The volume of water that passed through the trawl net was ~1.5 times the volume of water in an Olympic swimming pool (2002).

WHAT CAN I DO?

- Be responsible for all of your trash on land and on the water. Dispose of items properly.
- Get involved! Participate in local cleanups in your area.
- Remember that the land and sea, no matter where you are, are connected.
 - Reduce the amount of waste you produce.
 - Reuse items whenever possible. Choose reusable items over disposable ones.
 - Recycle as much as possible. Bags, bottles and caps, cans, cell phones, ink cartridges, and many other items can be recycled.



MAIN INGREDIENT = PLASTIC DEBRIS

Why such a common ingredient? Likely because of the abundance of plastics and the fact that some common types of plastic float.

Do plastics degrade in the ocean? In general, yes*, however there are many things to note. A few points to consider (Girigh and Sharma, 2008):

- There are MANY types of plastic, and thus many different chemical compositions
- Degradation rates depend on chemical composition, molecular weight, additives, environmental conditions, etc.

Based on research to date, most commonly used plastics do not ever fully "go away,"** but rather break down into smaller and smaller pieces (Andrady, pers. comm.). Also keep in mind that many of the bio-based and truly biodegradable plastics break down in a compost pile or landfill, but not necessarily in the ocean.

* Degradation here is defined as a process leading to deterioration of the physical properties of a plastic polymer (Bovey and Winslow, 1979).

** Here, "go away" refers to a process called mineralization, or the full conversion of all breakdown products into carbon dioxide, water, and small inorganic molecules (Andrady, 2009).

For more information & details please visit www.MarineDebris.noaa.gov/info/plastic.htm

For more information please visit www.MarineDebris.noaa.gov

References
Andrady, A.L. 2001. Polymer degradation and weathering in the environment. *Marine Pollution Bulletin* 42(5-6): 911-919.
Bovey, E.C. and Winslow, J.W. 1979. *Biodegradation of Plastics*. Marcel Dekker, New York.
Girigh, C. and Sharma, R. 2008. Debris in the ocean: Sources, fate and effects. *Marine Pollution Bulletin* 56(10): 1871-1878.



Can we clean up the oceans?

Boyan Slat from the Netherlands was only 16 years old when he was diving in Greece and discovered more plastic bags than fish. He then dedicated himself to researching the problem of plastic waste in the oceans and coming up with viable, sustainable solutions. He founded The Ocean Cleanup foundation and came up with a passive clean-up concept in 2012. Boyan then led a team to build and trial the concept during a feasibility study. In 2014 the 530-page report, written by seventy scientists and engineers, was published and this indicated that it is possible to clean an area half the size of the Pacific 'garbage patch' in just ten years.

How does it work?



The concept is based on a simple idea: 'Why move through the oceans, if the oceans can move through you?' By attaching floating barriers and platforms to the seabed, the floating plastic can be concentrated, extracted and then recycled. The platform is solar powered and the whole process is driven by the wind and currents. Nets are not used, so the impact on marine life is limited.

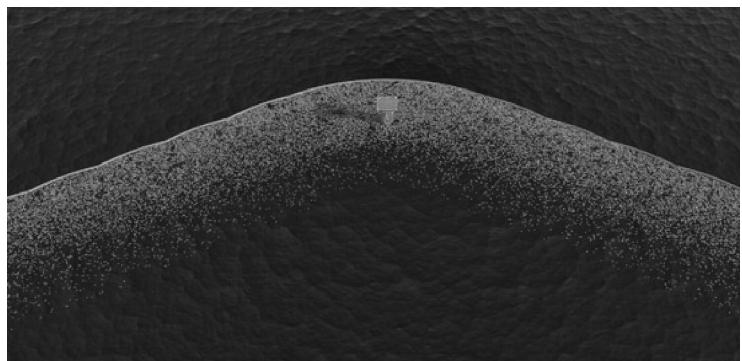
A completed system:

- It would contain two 50 km booms arranged in a V shape with a collection platform in the centre.
- The platform could hold 10,000 m³ of plastic and would be emptied every 1.5 months.
- It would be the largest structure ever placed in the ocean.
- It may remove most of the plastic in the top 3 metres of the ocean where concentrations are highest.
- Could cost thirty-three times less than conventional cleaning methods and do this up to 7900 times faster!

Combined with vital action to stop the source of the plastic on land, this method could help turn the tide in the battle to clean up our oceans.

The Ocean Cleanup foundation is now raising funds to build a large-scale working example. You can find out more and even donate here:

<http://www.theoceancleanup.com/>



What can you do to help?

Look for these symbols on plastic to identify what type it is:



PETE



HDPE



PVC



LDPE



PP



PS



OTHER

Use the table below to identify key features of commonly used and recyclable plastics:

Number 1 Plastics PET or PETE (polyethylene terephthalate)	Number 2 Plastics HDPE (high density polyethylene)	Number 3 Plastics V (Vinyl) or PVC	Number 4 Plastics LDPE (low density polyethylene)
<p>Found in: Soft drink and water bottles; mouthwash bottles; peanut butter containers; salad dressing and vegetable oil containers; ready meal food trays.</p> <p>Recycling: Picked up through most kerb-side recycling programs.</p> <p>Recycled into: Polar fleece; fibre; furniture; carpet; panelling; straps; (occasionally) new containers.</p>	<p>Found in: Milk containers; juice bottles; bleach; detergent and household cleaner bottles; shampoo bottles; some rubbish and shopping bags; motor oil bottles; butter and yogurt tubs; cereal box liners.</p> <p>Recycling: Picked up through most kerb-side recycling programs, although some allow only those containers with necks.</p> <p>Recycled into: Laundry detergent bottles; oil bottles; pens; recycling containers; floor tiles; drainage pipes; lumber; benches; doghouses; picnic tables; fencing.</p>	<p>Found in: Window cleaner and detergent bottles; shampoo bottles; cooking oil bottles; clear food packaging; electrical wire covers; medical equipment; windows; pipes.</p> <p>Recycling: Rarely recycled.</p> <p>Recycled into: Decks; panelling; mud flaps; flooring; cables; speed bumps; mats.</p>	<p>Found in: Squeezable bottles; bread; frozen food; dry cleaning and shopping bags; clothing; furniture; carpet.</p> <p>Recycling: LDPE is not often recycled through kerb-side programs, but some communities will accept it. Plastic shopping bags can be returned to many shops for recycling.</p> <p>Recycled into: Bin liners and cans; compost bins; shipping envelopes; panelling; wood products; garden tiles; floor tiles.</p>

Is India's space programme justified?

► Purpose ◀

This enquiry provides an opportunity for pupils to explore in depth a major current geographical issue which continues to receive considerable media and political coverage. This investigation will maintain its relevancy as more 'space emerging nations' (over fifty by current estimates) decide to invest heavily over the next decade in lunar programmes, despite experiencing many serious domestic social and economic challenges.

The enquiry begins by enabling the pupils to understand the extent of development issues which currently exist in India, as measured by a range of indicators. The emphasis here is on both understanding the rationale for each indicator and critiquing its value in terms of accurately highlighting the 'real' level of development in India. Pupils have an opportunity to apply a range of geographical techniques, including scatter graphs, to pursue a number of hypotheses. This enables the pupils to see how the existence of such high levels of poverty and underdevelopment throughout India forms the basis of widespread criticism of US\$1 billion being invested annually in a space programme.

Next, pupils evaluate the arguments which support such investment. They are able to understand what is referred to as 'the multiplier effect' and why its occurrence is the major economic argument in favour of investment in space exploration. Then they are able to explore this process further by studying in depth the case study of the city of Bangalore (increasingly referred to as 'Silicon Valley of India'), where initial investment by the government in space technology has resulted in private investment eight times greater, and the creation of 100,000 high-tech jobs nationally. Pupils are supported to make the link between such economic growth and the importance in India of stemming its 'brain drain' of scientists and engineers. Finally, in this section of the investigation pupils are able to reflect on some of the social and environmental benefits that have accrued from the Indian space programme, including the deployment of remote sensing satellites that can track the emergence and movement of cyclones and the annual monsoon rains.

As a summative exercise, pupils are challenged to take on the role of representatives of an advertising firm commissioned by a country set to make a huge annual investment in a domestic space programme. The brief is to produce a two-minute television advertisement to be played at peak time every day, which will convince people, whatever their current circumstances that such an investment is a worthwhile thing for the government to be doing. Pupils are able to draw upon all of the information researched on India and the United States through the investigation, to create a storyboard for their advertisement to form the basis of their 'pitch'.

► Aims ◀

Through this enquiry, pupils will be challenged and supported to:

- Identify, describe, explain and evaluate a wide range of traditional and contemporary indicators of development and quality of life.
- Apply a range of graphical techniques to analysing and explaining the relationship between various indicators of development, including hypothesis testing using scatter graphs, to identify patterns of correlation.
- Interpret a range of sources of geographical information to reach substantiated conclusions and judgements consistent with the evidence and communicate these in a variety of ways, including through visual representation, e.g. an advertising ‘pitch’; models; maps, numerical and quantitative skills and writing at length.
- Reflect on their own world view of current geographical issues and challenges and communicate their feelings and ideas appropriately.

► Links to Key Stage 3 subject content ◀

Pupils should be taught to:

Locational knowledge

Extend their locational knowledge and deepen their spatial awareness of the world’s countries, including their key physical and human characteristics.

Place knowledge

Understand geographical similarities, difference and links between places.

Human and physical geography

Understand physical geography relating to:

- Weather and climate.

Understand human geography relating to:

- International development.
- Economic activity.

Geographical skills and fieldwork

- Build on their knowledge of globes, maps and atlases and apply and develop this knowledge routinely in the classroom and in the field.
- Interpret topographical and thematic mapping, and aerial and satellite photographs.
- Use Geographical Information Systems (GIS) to view, analyse and interpret places and data.

► Possible assessable outcomes ◀

- Identification of limitations of Gross Domestic Product per head as indicator of development.
- Justifying the aspects of poverty in India which should be prioritised by the government.
- Identifying physical and human causes of poverty in Sub-Saharan Africa.
- Construction and interpretation of scatter graph showing the relationship between the percentage of Multidimensional Poverty Index (MPI) poor in a country and the intensity of poverty.
- Paragraph of writing explaining how the multiplier effect in economics works.
- Highlighting likely impact of ‘brain drain’ on both donor and recipient countries.
- Explanation of how space programme ‘spin offs’ now benefit people.
- Design and presentation of a television advertisement.

Indicator	Unit of measurement	India	United States
Crude birth rate	The number of live births per 1000 people per year	19.89	13.42
Crude death rate	The number of deaths per 1000 people per year	7.35	8.15
Mother's mean age at first birth	The average age of a woman when she has her first baby	19.9	25.4
Maternal mortality rate	The number of deaths per 100,000 live births from any cause related to pregnancy and birth	200	21
Infant mortality rate	The number of deaths of children less than one year of age per 1000 live births	43.19	6.17
Life expectancy at birth	The average number of years that a person may expect to live	67.8	79.56
Health expenditure	% of Gross Domestic Product spent on health	3.9	17.9
Physicians density	Number of doctors per 1000 people	0.65	2.42
Hospital bed density	Number of hospital beds available per 1000 people	0.9	3.0
Access to safe drinking water	% of the population that has a safe source of water from which to drink	92.6	99.2
Access to modern sanitation facilities	% of population using safe sewerage and waste disposal systems	36.0	100
Children underweight	% of children under the age of five years who are underweight	43.5	1.3
Obesity level	% of adults with a body weight at least 20% higher than it should be	33.0	1.9
Education expenditure	% of Gross Domestic Product spent on education	3.2	5.4
Literacy level	% of population over fifteen years able to read and write	62.8 (Overall) 75.2 (Male) 60.8 (Female)	99.0 (Overall) 99.0 (Male) 99.0 (Female)
School life expectancy	Total number of years of schooling that a child can expect to receive	12.0 (Overall) 12.0 (Male) 11.0 (Female)	17.0 (Overall) 16.0 (Male) 17.0 (Female)
Child labour	% of children aged 5-14 years in full time employment	12.0	0
Youth unemployment	% of 15-24 year olds without work	10.75	17.3

CIA World Factbook 2013

Calculating the Multidimensional Poverty Index (MPI)

Enquiry Support Materials

The Multidimensional Poverty Index (MPI) was developed in 2010. It uses the same three dimensions as the HDI – health, education and standard of living – but measures them using ten indicators, rather than three, in order to give a much more precise measurement of standards of living. Each dimension and each indicator within a dimension is equally weighted.

Dimension	Indicators
Health	<ul style="list-style-type: none">• Child Mortality• Nutrition
Education	<ul style="list-style-type: none">• Years of school• Children enrolled
Living Standards	<ul style="list-style-type: none">• Cooking fuel• Toilet• Water• Electricity• Floor• Assets

The MPI shows two things: firstly the **percentage** of people who are poor in a country, i.e. the proportion of people who are deprived in at least 33% of the indicators below, and secondly, the intensity of that poverty, i.e. in how many of the ten indicators are they deprived?

The indicators are:

- **Education**

- 1 **Years of schooling:** deprived if no household member has completed five years of schooling.
- 2 **Child school attendance:** deprived if any school-aged child is not attending school up to Class 8.

- **Health**

- 3 **Child mortality:** deprived if any child has died in the family.
- 4 **Nutrition:** deprived if any adult or child is malnourished.

- **Standard of Living**

- 5 **Electricity:** deprived if the household has no electricity.
- 6 **Sanitation:** deprived if the household's sanitation facility is not improved, or if it is improved but is shared with other households.
- 7 **Drinking water:** deprived if the household does not have access to safe drinking water, or safe drinking water is more than a thirty-minute walk from home round-trip.
- 8 **Floor:** deprived if the household has a dirt, sand or dung floor.
- 9 **Cooking fuel:** deprived if the household cooks with dung, wood or charcoal.
- 10 **Assets ownership:** deprived if the household does not own more than one radio, TV, telephone, bike, motorbike or refrigerator and does not own a car or truck.

A real example is the country of Niger where 92.7% of the country's population is MPI poor and the intensity of poverty is 69.3%.

Table of MPI in 107 developing countries

Enquiry Support Materials

Country	% of people who are MPI poor	Average intensity of MPI poverty
Albania	1.4	37.7
Angola	77.4	58.4
Argentina	3.0	37.7
Armenia	1.1	36.2
Azerbaijan	5.3	39.4
Bangladesh	57.8	50.4
Belarus	0.0	35.1
Belize	5.6	42.6
Benin	71.8	57.4
Bhutan	27.2	43.9
Bolivia	20.5	43.7
Bosnia and Herzegovina	0.8	37.2
Brazil	2.7	39.3
Burkina Faso	82.6	64.9
Burundi	84.5	62.7
Cambodia	52.0	48.4
Cameroon	53.3	53.9
Central African Republic	86.4	59.3
Chad	62.9	54.7
China	12.5	44.9
Colombia	5.4	40.9
Comoros	73.9	55.2
Côte d'Ivoire	61.5	57.4
Croatia	4.4	36.3
Czech Republic	3.1	33.4
Djibouti	29.3	47.3
Dominican Republic	4.6	39.4
Congo, Democratic Republic of the	73.2	53.7

Country	% of people who are MPI poor	Average intensity of MPI poverty
Ecuador	2.2	41.6
Egypt	6.0	40.7
Estonia	7.2	36.5
Ethiopia	88.6	63.5
Gabon	35.4	45.5
Gambia	60.4	53.6
Georgia	0.8	35.2
Ghana	31.2	46.2
Guatemala	25.9	49.1
Guinea	82.5	61.3
Guyana	13.4	39.5
Haiti	56.4	53.0
Honduras	32.5	48.9
Hungary	4.6	34.3
India	53.7	52.7
Indonesia	20.8	45.9
Iraq	14.2	41.3
Jordan	2.4	34.4
Kazakhstan	0.6	36.9
Kenya	47.8	48.0
Kyrgyzstan	4.9	38.8
Laos	47.2	56.5
Latvia	1.6	37.9
Lesotho	35.3	44.1
Liberia	83.9	57.7
Macedonia	1.9	40.9
Madagascar	66.9	53.3
Malawi	72.1	52.8

Table of MPI in 107 developing countries

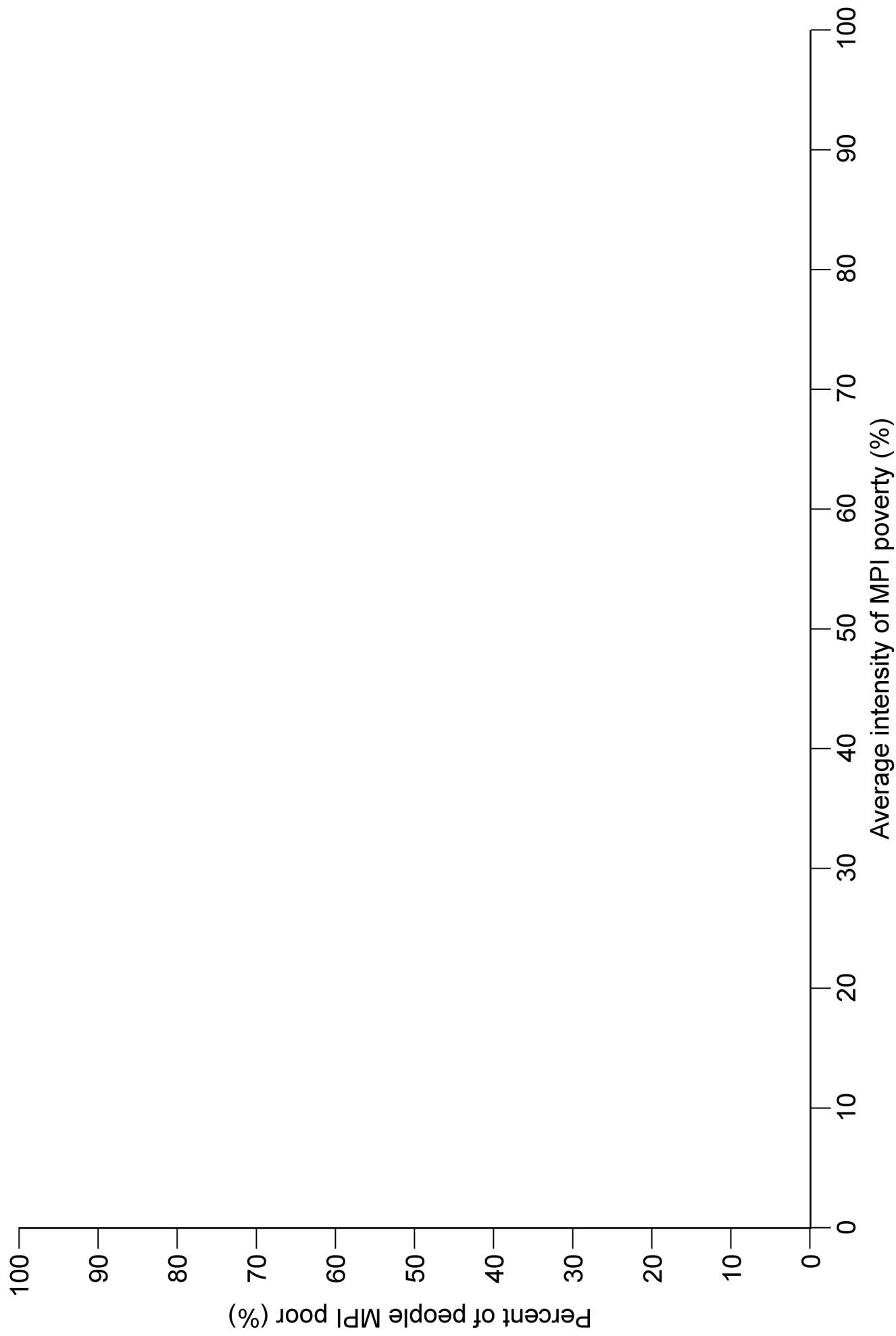
Enquiry Support Materials

Country	% of people who are MPI poor	Average intensity of MPI poverty
Maldives	5.2	35.6
Mali	86.6	64.4
Mauritania	61.7	57.1
Mexico	4.0	38.9
Moldova	1.9	36.7
Mongolia	15.8	41.0
Montenegro	1.5	41.6
Morocco	10.6	45.3
Mozambique	79.3	64.6
Myanmar/Burma	31.8	48.3
Namibia	39.6	47.2
Nepal	64.7	54.0
Nicaragua	28.0	45.7
Niger	92.4	69.4
Nigeria	54.1	57.3
Occupied Palestinian Territories	1.4	37.3
Pakistan	49.4	53.4
Paraguay	13.3	48.5
Peru	19.9	43.2
Philippines	13.4	47.4
Congo, Republic of the	40.6	51.2
Russia	1.3	38.9
Rwanda	80.2	53.2
São Tomé and Príncipe	34.5	44.7
Senegal	66.9	57.4
Serbia	0.8	40.0

Country	% of people who are MPI poor	Average intensity of MPI poverty
Sierra Leone	77.0	57.0
Somalia	81.2	63.3
South Africa	13.4	42.3
Sri Lanka	5.3	38.7
Suriname	8.2	47.2
Swaziland	41.4	44.5
Syria	5.5	37.5
Tajikistan	17.1	40.0
Tanzania	65.2	56.3
Thailand	1.6	38.5
East Timor	68.1	52.9
Togo	54.3	52.4
Trinidad and Tobago	5.6	35.1
Tunisia	2.8	37.1
Turkey	6.6	42.0
Uganda	72.3	50.7
Ukraine	2.2	35.5
United Arab Emirates	0.6	35.3
Uruguay	1.7	34.7
Uzbekistan	2.3	36.2
Vanuatu	30.1	42.7
Vietnam	17.7	47.2
Yemen	52.5	53.9
Zambia	64.2	51.2
Zimbabwe	39.7	45.3

Source: Alkire, S. Roche, JM. Santos, ME. and Seth, S (November 2011) <http://ophi.qeh.ox.ac.uk>. Multidimensional Poverty Index: 2011 Data. Oxford Poverty and Human Development Initiative. Available at: www.ophi.org.uk/policy/multidimensional-poverty-index/.

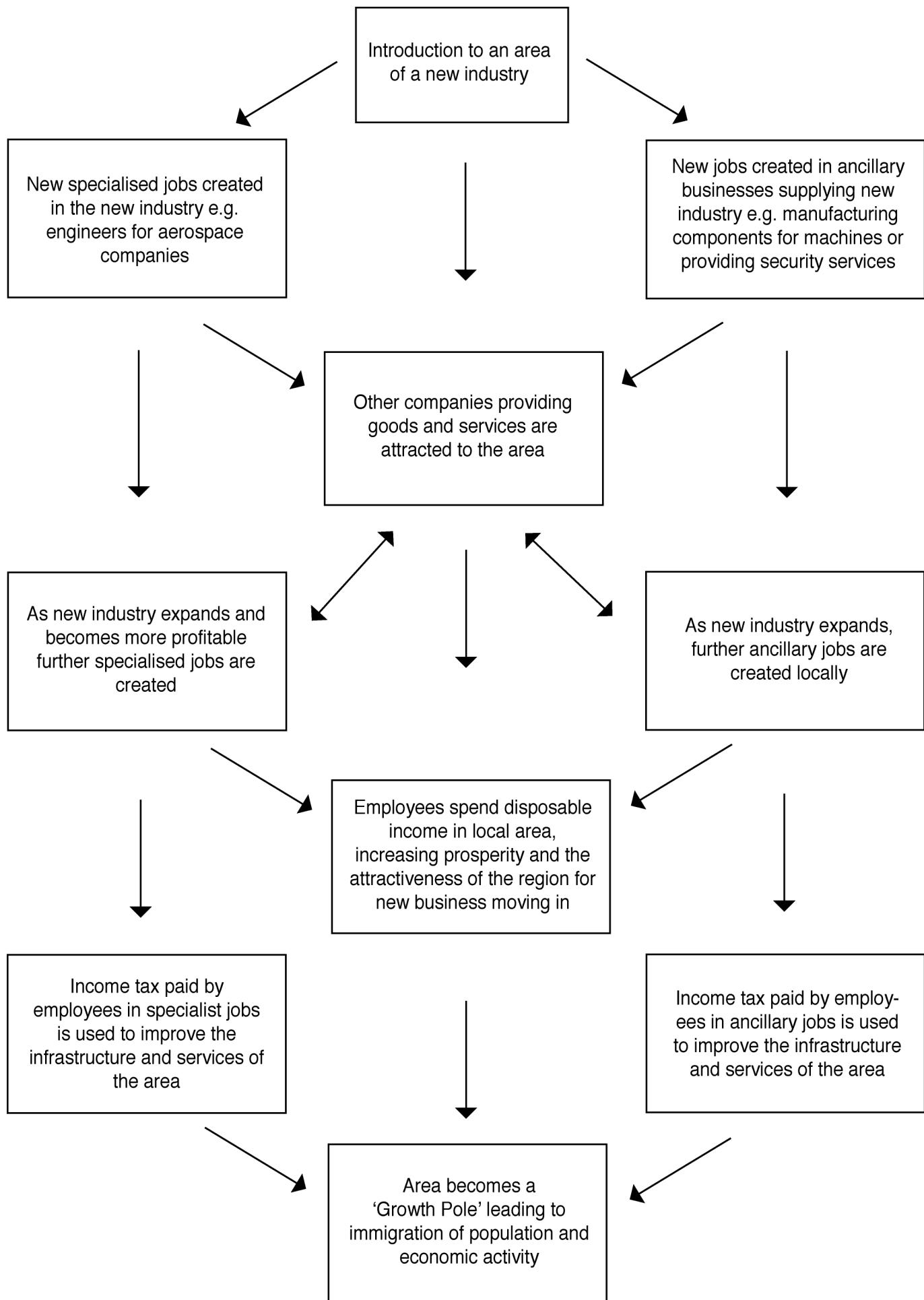
Plot the below scatter graph to show the relationship between the percentage of people who are MPI poor and the average intensity of MPI poverty in 107 countries.



Standard of living in top ten most technologically advanced countries

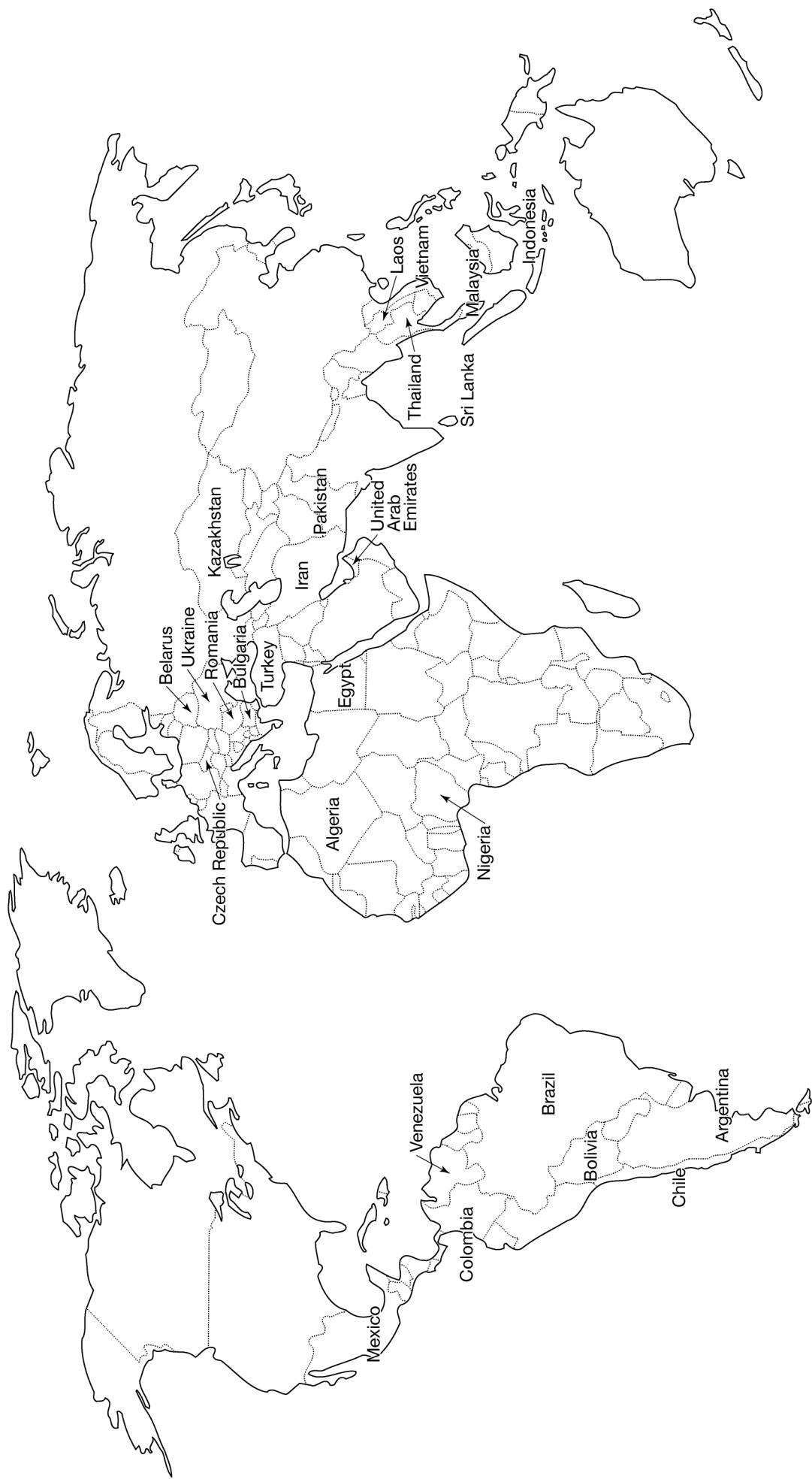
Enquiry Support Materials

Country	1. Level of world technology ranking	2. International Monetary Fund (IMF) ranking of standard of living (out of 184 countries)	3. World Bank ranking of standard of living (out of 189 countries)	4. Central Intelligence Agency (CIA) ranking of standard of living out of 193 countries	5. United Nations ranking of standard of living out of 193 countries	6. Human Development Index ranking out of 187 countries	7. International Labour Organisation (United Nations) adjusted average wage ranking out of 72 countries	Total ranking of standard of living. Add up the total of columns 1–7. The lowest will be ranked 1 and the highest 10	Happiness Index assessment out of 111 countries
Japan	1	24	28	26	15	17	17	17	45
Singapore	2	8	12	13	13	9	14	14	90
United States of America	3	9	13	14	14	5	4	105	105
United Kingdom	4	23	26	26	26	14	5	5	41
Canada	5	10	14	14	15	8	12	12	64
Netherlands	6	13	16	16	18	4	16	16	66
China	7	83	84	84	83	91	71	71	60
Sweden	8	7	10	10	12	12	7	7	52
Australia	9	5	7	7	9	2	15	15	76
Finland	10	14	18	18	16	24	9	9	70

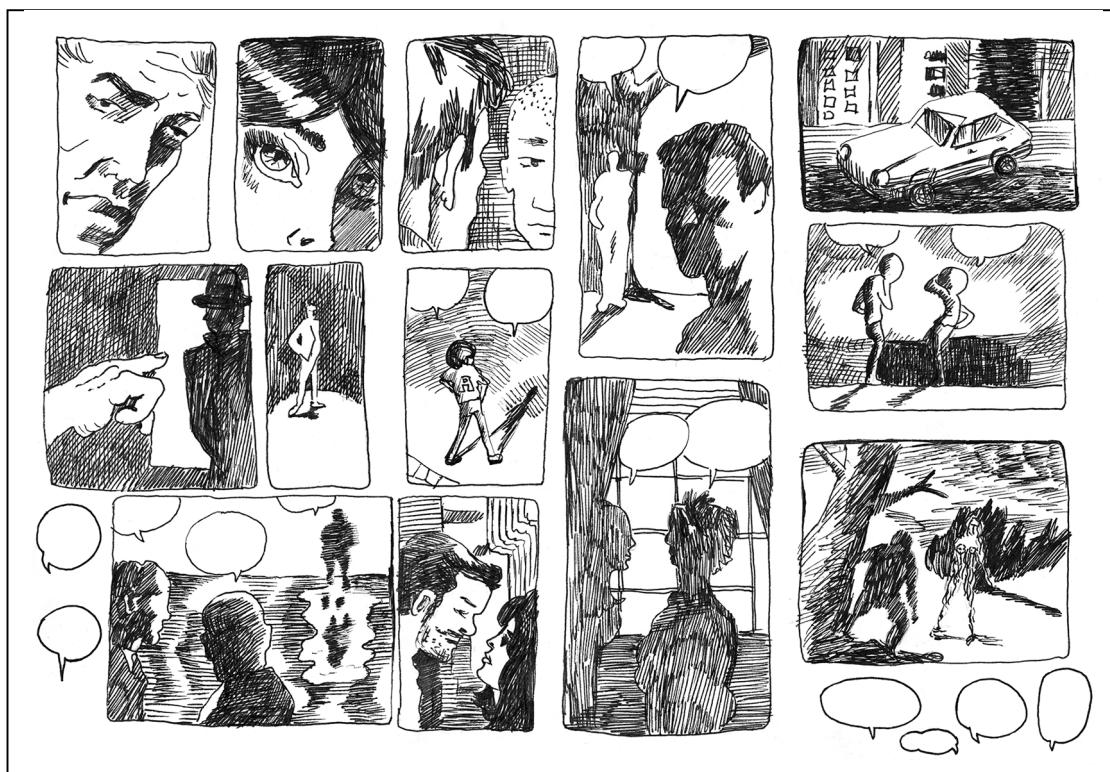


Map of emerging space nations

Enquiry Support Materials



Example storyboard:



Template:

Action	Dialogue	Timing (seconds)

Why are Thandi and Moses working in Soweto market?

► Purpose ◀

The issue of desertification is widely recognised as one of the most serious environmental and development challenges facing the world. Pupils begin their enquiry in the Shangombo district of western Zambia. Through the interpretation of a wide range of data, they come to appreciate its main geographical characteristics and the opportunities and constraints the environment offers. This is a remote and marginal area, not only of the country of Zambia, but also of the continent as a whole. By presenting and interpreting 'normal' climate data for a 'typical' year in Shangombo, the pupils are able to appreciate the way in which routine weather patterns, such as periods of prolonged drought during the dry season with flash flooding at the beginning of the wet season, presents real constraints in terms of how the local environment can be farmed, even in 'good' years.

Next, the pupils are able to investigate the ways in which climate change is exacerbating these normal conditions. By examining numerical, graphical and visual data, pupils are able to see how human factors are combining with physical processes to create the 'vicious circle of land degradation' which leads to desertification.

Pupils are encouraged to look at the wider global context of desertification and to understand that western Zambia is only one part of the world's drylands, which cover 45% of the land surface of the planet and are particularly prevalent in poorer countries. In North America, the pupils investigate the dryland city of Las Vegas, in particular the water supply issues it now faces, as continuing population growth and tourism is placing impossible demands on the Colorado Basin, and especially Lake Mead. There is an opportunity for pupils to study the recently launched strategy to reduce the ecological footprint of Las Vegas, and to evaluate whether the community will ever reach a point of sustainability, particularly in regard to water supply. Having now understood the prime causes of desertification, particularly overgrazing, and its impact, especially in relation to future food supplies, pupils are able to spend some time investigating what is being done around the world to restore land and reverse the desertification process.

Finally, pupils are encouraged to see the challenge of desertification as a truly global and interconnected issue, and the way in which environmental management programmes in very wet places, far away from Shangombo, can contribute to the reduction of some of the climatic conditions which give rise to desertification. In recent years increased levels of CO₂ accumulation in the atmosphere have been caused just as much by the inability of the earth's biosphere to absorb more carbon as through emissions. The Mires Project in Dartmoor National Park aims to rewet the peat bogs and restore them to their original state. In doing this, their capacity to absorb CO₂ will increase. This will contribute to the reduction of the build-up of the gas in the atmosphere, which has been identified as a contributing factor in global warming and the increasing variability of weather patterns in places such as southern Africa, which in turn increases the risk of desertification. Further links to the work of the education team at Dartmoor National Park and the Mires Project in particular can be made at <http://www.dartmoor-npa.gov.uk/learningabout> and <http://www.dartmoor-npa.gov.uk/lookingafter/laf-naturalenv/dartmoormiresproject>

► Aims ◀

Through this enquiry, pupils will be challenged and supported to:

- Identify, describe and explain the causes of land degradation leading to desertification.
- Evaluate in particular the role of human and physical factors in creating the ‘vicious cycle of desertification’ in many of the world’s drylands.
- Make judgements about the impact of desertification in terms of human and economic costs and the implications of these for the future well being of the planet.
- Understand, through the study of a number of case studies, what is being done by countries to combat desertification and restore degraded environments.
- Appreciate how environmental management projects in countries not experiencing desertification can contribute to reducing its occurrence elsewhere in the world.
- Interpret a range of sources of geographical information to reach substantiated conclusions and judgements consistent with the evidence and communicate these in a variety of ways, including through models, maps, numerical and quantitative skills and writing.
- Reflect on their own world view of current geographical issues and challenges and communicate their feelings and ideas appropriately.

► Links to Key Stage 3 subject content ◀

Pupils should be taught to:

Locational knowledge

- Extend their locational knowledge and deepen their spatial awareness of the world’s countries, including their key physical and human characteristics.

Place knowledge

- Understand geographical similarities, differences and links between places.

Human and physical geography

- Understand physical geography relating to:
 - Weather and climate.
 - Changes in climate from the Ice Age to present.
- Understand human geography relating to:
 - International development.
 - Population and urbanisation.
 - Economic activity.
 - Use of natural resources.

Geographical skills and fieldwork

- Build on their knowledge of globes, maps and atlases and apply and develop this knowledge routinely in the classroom.
- Interpret topographical and thematic mapping, and aerial and satellite photographs.
- Use Geographical Information Systems (GIS) to view, analyse and interpret places and data.

► Possible assessable outcomes ◀

- Exercise on '*The Geography of Shangombo*'.
- Construction and interpretation of a climate graph of Shangombo.
- Construction and interpretation of a flow diagram.
- Research: '*Can Las Vegas become a sustainable community?*'
- Television news report about the circumstances of Thandi and Moses.
- Report of one case study of land restoration from around the world.
- Design and production of a cartoon/comic strip explaining the work and the local and global relevance of the Mires Project.

Indicator	District	Ranking of deprivation
Overall income poverty level of the population (% of the population)	Lukulu Chavuma Milengi Luangwa Shangombo	1 2 3 4=
Level of extreme income poverty of the population (% of the population)	Lukulu Shangombo Chavuma Luangwa Samfya	1 2 3 4 5
Proportion of the adult population with no education (%)	Shangombo Mwinilunga Katete Petauke Chadiza	1 2 3 4 5
Proportion of the population without access to safe drinking water or sanitation facilities (%)	Shangombo Kaoma Sesheke Mpika Chibombo	1 2 3 4 5
Proportion of population lacking access to primary school (average distance in km to nearest primary school) %	Shangombo Kaoma Sesheke Mpika Chibombo	1 2 3 4 5
Proportion of population lacking access to health facilities (average distance in km to nearest health centre) %	Sesheke Shangombo Kaoma Mkushi Chibombo	1 2 3 4 5
Proportion of population lacking access to market (average distance in km to nearest market) %	Sesheke Siavonga Shangombo Kaputa Chilubi	1 2 3 4 5
Proportion of population lacking access to transport facilities (average distance in km to nearest transport facility) %	Sesheke Chama Shangombo Milengi Kaoma	1 2 3 4 5

Type of geography	Shangombo
Physical geography: Think about the natural features of the environment: its relief, landforms, drainage, climate, soils and vegetation.	
Economic geography: Think about how people are exploiting local resources and raw materials and for what purpose.	
Social geography: Think about the ways in which people have organised themselves within the environment and the opportunities and challenges they face together.	

United Nations National Report, Zambia 2013:

Zambia is one of the countries highly impacted on by severe weather and extreme climate events. Studies suggest that losses due to flooding have increased in frequency over the past two decades. In fact, in Zambia it is estimated that 75 percent of all disasters are attributed to weather conditions, particularly floods and drought.

News report from Muvi Television 2014:

Shangombo Farmers Predict More Hunger Spells

Some farmers in Shangombo district, Western Province have predicted more hunger spells in the year 2014. Shangombo District Farmers Association Chairperson Ackson Sihupa says the lack of seed in the district will subject the people to more hunger in the New Year.

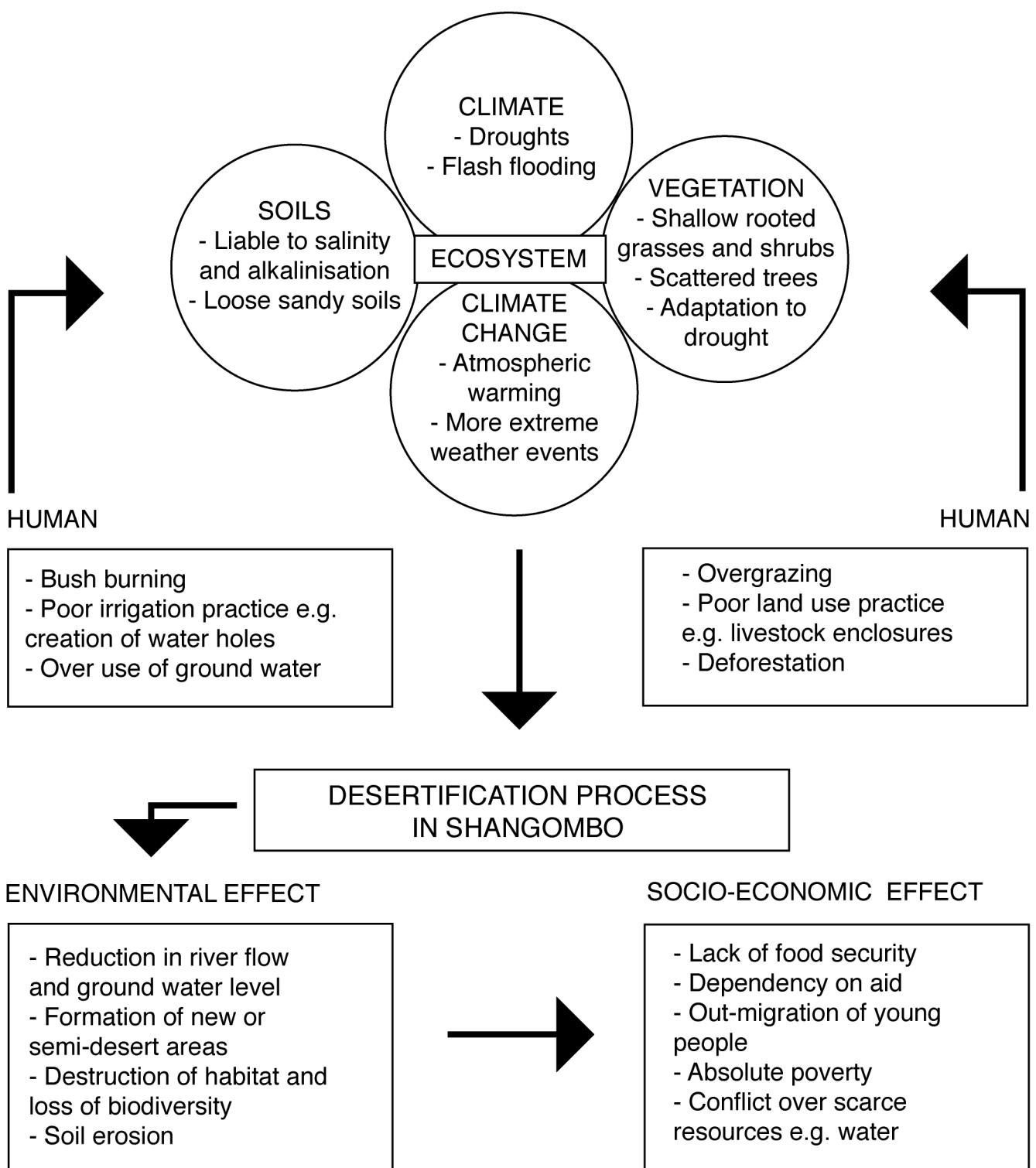
Watch the news report on YouTube at: <https://www.youtube.com/watch?v=eI9eyR80i4s>

Online blogger:

Fedraw Makuka, Zambia, April 23rd 2014 at 10.34am

I was born and brought up in Shangombo and am now over 50 years old. For as long as I can remember it has been a hunger stricken state. As I write this I am thinking back to so many occasions when our entire family was hungry for months on end. Too often we really worried about not surviving at all in some years. I recall my parents wondering whether anyone in the government in Lusaka was actually aware of our plight. I doubt it to be honest with you. After so many years it is now up to the government to find a long lasting solution to Shangombo's problems.

The people cannot just depend upon locally produced maize anymore. The place needs other economic activities from which people can earn a decent living – enough to buy food from outside. Another solution would be for the government to provide farmers with drought resistant crops to trial in Shangombo – crops that can cope with the poor and variable patterns of rainfall the place receives. The seeds of these crops are expensive though so the local farmers will need assistance from the government to buy them to begin with. I know that this will cost the government money to start with but it will be well worth it because they will save the money in the long term through not having to buy emergency food supplies for the people of the state when the harvest of traditional maize crops fail and they go hungry.



What should appear in your television news report about Thandi and Moses?

The average length of a television news report is less than three minutes. Working in a group of four, you will write the script and then present a three-minute ‘news package’, as it is often called in the media, about Thandi and Moses. The report needs to be filmed on location from the Soweto market in Lusaka, Zambia, where Thandi and Moses work. From there the reporter will talk to the camera – this is called a ‘standup’.

The organisation of a news report follows a clear conventional structure, which is explained at the following two websites:

http://howikis.com/Write_a_TV_News_Script

http://news.bbc.co.uk/1/hi/school_report/6180944.stm

In addition, there are many examples of news reports produced by schools for the 2013 BBC School Report competition that you can look at for ideas and inspiration on YouTube, such as:

<http://www.youtube.com/watch?v=l2sImKWpIdM>

Use the script template on page 44 of the Teacher Book to draft the organisation and running order of your news report. There is also an example page from a completed script on page 43, which you can use as a guideline if you wish.

Within the three-minute maximum for your report, you must ensure that all of the following is clear:

- Where you are reporting from and why.
- Who Thandi and Moses are, that their home is Shangombo, and what they are doing to survive in the market.
- Why Thandi and Moses migrated from Shangombo (you need to ensure that you use your geographical knowledge to explain to the viewer the causes and effects of land degradation and desertification and how this leads to out-migration of young people).
- How Thandi and Moses’s situation is just one example, which is repeated around the world because desertification is a global problem.
- What the future is likely to hold for Thandi and Moses and the kinds of things that are being done to combat desertification.

Unveiling of a new hybrid crossover car at London Motor Show

Timing (seconds)	Video	Audio
0 – 0.15	Close up of alloy wheel slowly panning out to reveal all of car but from a floor based perspective as vehicle slowly rotates on its plinth.	One thing is always certain at the annual London Motor Show – a real surprise will await you. Things are rarely what they seem at first sight. There's always something here to take your breath away.
0.16 – 0.34	Shots of open engine and walnut laminated dash, leather seats and double panoramic sunroofs. Use soft light to suggest bright sunshine. Pictures from amongst the crowd of people jostling around to get a good view.	I'm Gyles Morris and this is the electric hybrid crossover car that the manufacturers say the world has been waiting for. And they could be right. As you can see it's certainly caught the attention of both family motorists and professional pundits alike. At this year's motor show it's the one exhibit that everyone is trying to experience.
0.35 – 1.15	Pre-recorded insert of motoring correspondent test-driving the car around a race circuit. Interior shots plus bonnet mounted views and road level drive by cameras with plenty of dust and leaves in the air as it speeds past.	We sent our motoring correspondent Chris Wright to test-drive this little beauty. As you can see he certainly put it through its paces and enjoyed doing it by the look of it! What we wanted to know from Chris of course is whether there is any truth in the hype surrounding the launch of the car. Is it a dream machine or are their potential nightmares awaiting unsuspecting enthusiasts?
1.16 – 2.24	Head and shoulders of Chris Wright slowly panning out to show him in a relaxed pose leaning on the bonnet of the car talking to camera. During narrative cut-aways to pre-recorded test-drive shots together with close ups of engine, exhausts and filling up with fuel at motorway service station.	Well here it is – the car everyone has been waiting for – well that's what we've been told of course by the company that makes it. Well they would wouldn't they? Let me say right from the outset that if you are looking for a car that will help save the planet but give your front drive a Hollywood image makeover, then this work of art is for you. Make no mistake, it's an electric hybrid all right so you won't avoid having to fill up from time to time, but you will use less fuel and save money to boot. Another plus is that it won't need to be plugged in at night. Its fuel powered until the battery is fully charged and then it crosses over to electric. It will take a family of four comfortably and with a top speed of 128 mph it will also appeal to the younger market. Insurance premiums are likely to be well below average and you won't be spending a fortune taxing it either. My only criticism was that I only had it to test-drive for two days. I seriously found it difficult to hand back and that is coming from a roadhardened motoring reporter who is really picky about what he chooses to be seen driving around in.
2.25 – 3.00	Views of visitors to the motor show milling around the car, sitting in the driving seat and taking photos. Cut away to film of cars coming off the manufacturing line and being lined up along dealer showroom forecourts, all with 'sold' signs on the windscreens.	Thanks, Chris – I think you enjoyed that didn't you? Well there you have it then. There are plenty of people here that are already saying that this vehicle is not merely the car of the year, but perhaps of the decade. Revolutionary performance combined with eco-technology. But I hate to be a spoilsport but I can reveal one very big problem with it – actually getting your hands on one! Order books are full and it could be a frustrating nine-month wait if you choose to spend your cash. But I think there are plenty of people here prepared to be patient. This is Gyles Morris returning you to the studio.

Timing (seconds)	Video	Audio

Case-study profile of measures taken globally to combat desertification

Country: _____

Location: _____

Main causes of desertification here:

- _____
- _____
- _____
- _____

Main consequences of desertification here:

- _____
- _____
- _____
- _____

Measures taken to restore the land and combat desertification (include diagrams if appropriate):

- _____
- _____
- _____

How does water consumption create interdependence and conflict?

► Purpose ◀

The purpose of this enquiry is to examine the interdependence created by global agriculture and the specific impact this has on people in regard to water consumption. Pupils are asked to consider their own water consumption before examining the distribution of global water resources. This then leads to a focus on the concept of virtual water and water footprints, before examining the challenges and conflicts being caused in Peru – a country that suffers from both a physical and an economic scarcity of water, yet one that leads the global supply of certain agricultural products for export. The impact of these challenges is leading to some innovative technological solutions.

The pupils begin by examining the patterns of global water scarcity and some typical consumption figures. They are provided with a global water scarcity map, and are asked to describe any of the patterns seen and to suggest reasons for these patterns. The disparity in global consumption figures should be used in relation to the map prior to asking pupils to consider their own daily consumption of water. Pupils should then add their own consumption to the bar graph template which has been provided. This will allow them to compare their own estimated consumption to that of other nations, their classmates and the average for their own country.

Pupils are then asked to examine the global distribution of water resources and to consider why this presents challenges for humans. Can they make links between the scarcity problems map and the water distribution block diagram? After they have reviewed their personal consumption, it is vital to ask the pupils if that is their absolute total consumption. Could they be responsible for consuming any other water? This should lead into Question 5.2, when the pupils are asked if they are responsible for using someone else's water. They are introduced to the concept of virtual or embedded water – where the total amount of water used in the production of a foodstuff is included. The example of beef is given, but there are many others. The pupils should generate their own enquiry questions on virtual water, before sequencing the questions and researching them – producing their own outcome piece of work that demonstrates their understanding of virtual water and interdependence.

This then sets the scene for the remainder of this enquiry, which first examines the scarcity challenges faced by Peru by asking 'Why is Marisa catching fog?' Marisa lives in a slum in Lima with no running water. Pupils are challenged to use a complex range of choropleth maps, climate graphs, satellite images, glacier maps, photographs, demographic data, aerial photos and diagrams to establish why Marisa has to 'catch fog'. Pupils can use the resources here to help interpret the range of information presented, prior to undertaking a piece of explanatory writing. There is a peer assessment sheet included to allow pupils to develop their writing in the draft stage. The answer is complex and relates to more than a lack of water or 'poverty'. The purpose of this is to allow the students to develop detailed place-based locational knowledge and to examine human/physical interaction. They will need to synthesise a lot of information to do this successfully.

Having contextualised the situation in Lima and in Peru in general, it is fascinating to discover the role of industrial agriculture in parts of the country. Whilst those in the slums of Lima struggle for basic water needs, big farms draw upon diminishing aquifers to irrigate crops for export to Europe and the USA. Asparagus is the leading crop and production is a thirsty business. In the final key question, pupils are asked to draw together their work on Marisa and virtual water, to produce an infographic that investigates how water consumption leads to interdependence and conflict. Finally, the pupils are introduced to the mammoth Olmos irrigation scheme which involves diverting water destined for the Amazon basin across the Andes to irrigate a desert. Whilst investigating this scheme and examining the geographical reasons for its location, pupils are asked, 'Will this water benefit Marisa and her family?'

► Aims ◀

Through this enquiry, pupils will be challenged and supported to:

- Develop contextual knowledge of the location of globally significant places, including their defining physical and human geographical characteristics, and how these provide a geographical context for understanding the actions of geographical processes.
- Understand the processes that give rise to key physical and human features of the world, how these are interdependent and how they bring about spatial variation and change over time.
- Interpret a range of sources of geographical information about physical and human processes.

► Links to Key Stage 3 subject content ◀

Pupils should be taught to:

Locational knowledge

- Extend their locational knowledge and deepen their spatial awareness of the world's countries including their key physical and human characteristics.

Human and physical geography

- Understand through the use of detailed place-based exemplars at a variety of scales the key processes in:
 - Physical geography relating to weather and climate, hydrology.
 - Human geography relating to population and urbanisation, economic activity and the use of natural resources.
- Understand how human and physical processes interact to influence and change landscapes, environments and the climate, and how human activity relies on effective functioning of natural systems.

Geographical skills and fieldwork

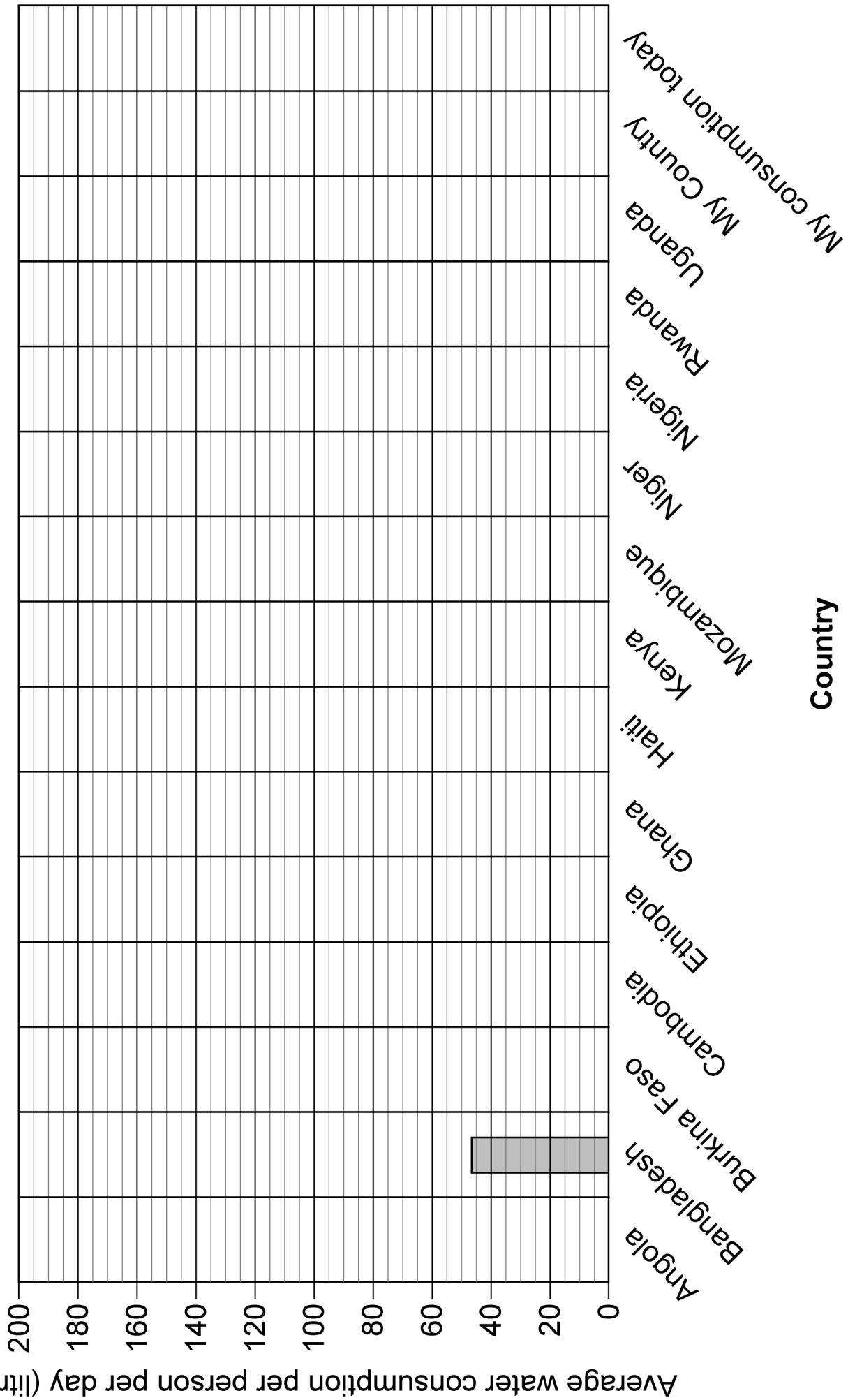
- Build on their knowledge of globes, maps and atlases and apply and develop this knowledge routinely in the classroom.
- Interpret topographical and thematic mapping, and aerial and satellite photographs.
- Use Geographical Information Systems (GIS) to view, analyse and interpret places and data.

► Possible assessable outcomes ◀

The skills of map interpretation could be looked at in terms of water scarcity and the linking of maps in Peru. The explanatory writing that requires a huge amount of synthesis and evaluation should be a focus of any assessment of this enquiry. Finally, the geographical content and understanding of interdependence and conflict should form the basis of assessment of the outcomes of the infographic.

Use the data from the Student Book and the calculations of your own consumption to complete the bar graph below. Find out the consumption figure for your country and add this too.

Comparing Water Consumption

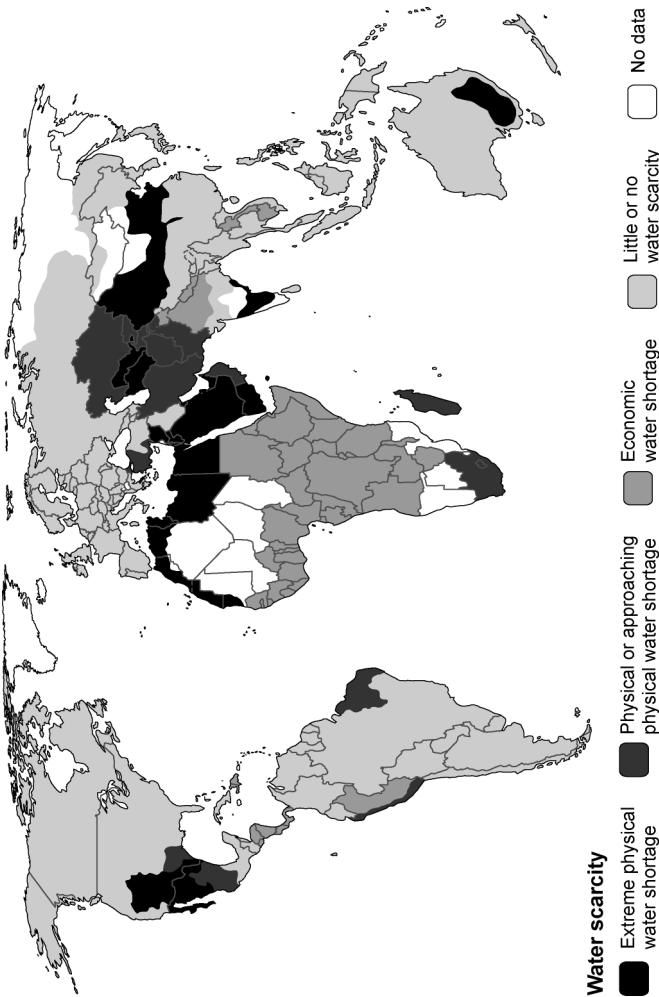


Use the map below to help you fill out a box on water scarcity for each continent. Each box needs to contain a description of the situation and an explanation. You might want to use a climate or development indicator map from an atlas to help you.

North America

Situation:

Explanation:



Europe

Situation:

Explanation:

Asia

Situation:

Explanation:

Oceania

Situation:

Explanation:

Africa

Situation:

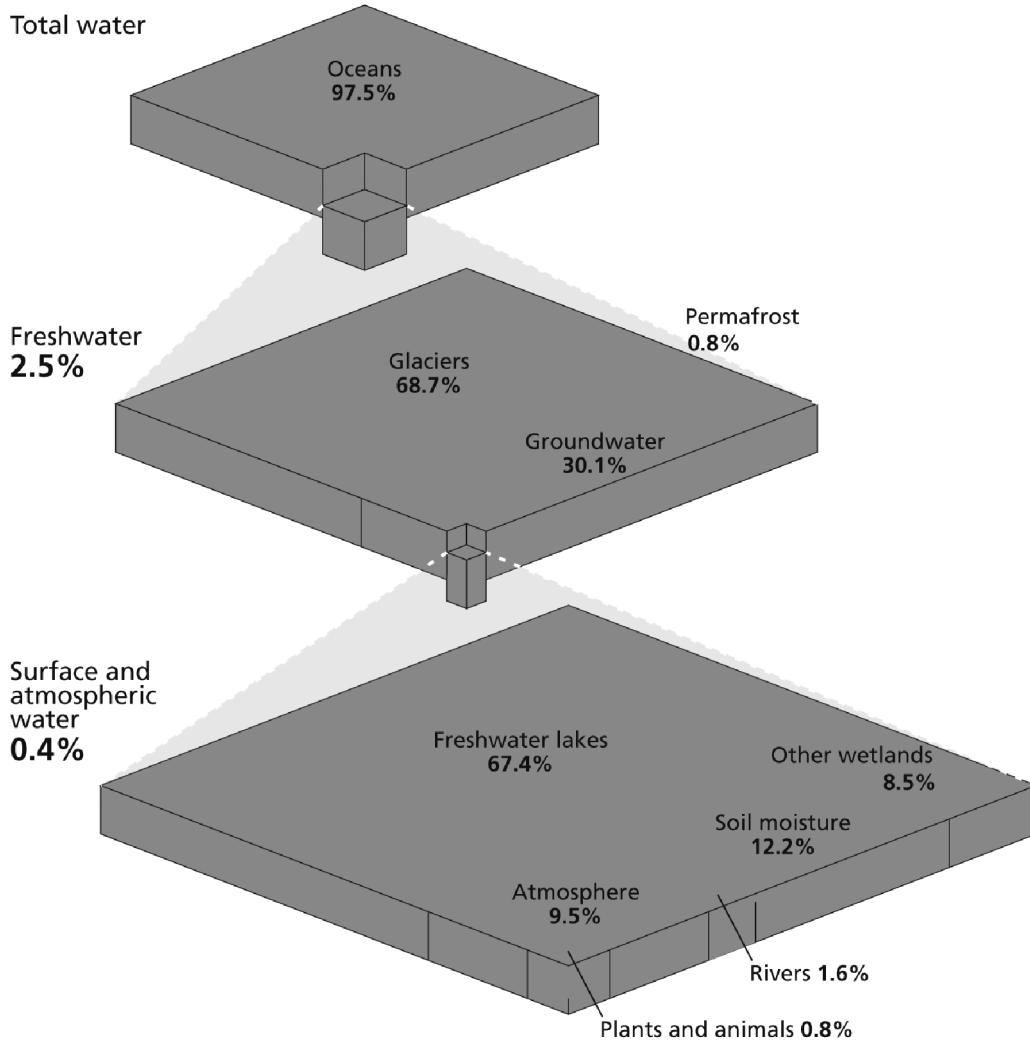
Explanation:

South America

Situation:

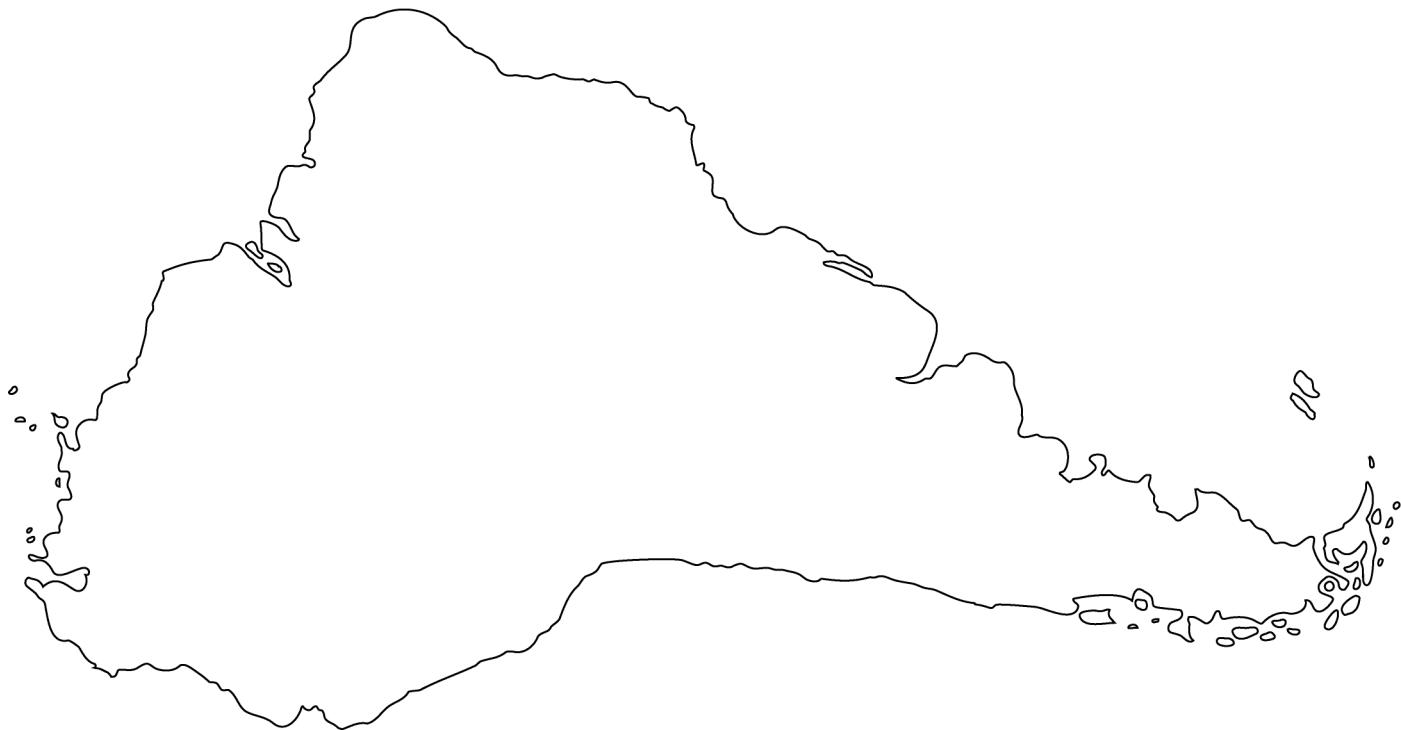
Explanation:

Distribution of Global Water Resources



Use the diagram above and the Student Book to answer the following question:

Why does the distribution of water on Earth present many challenges for humans?



On the blank map of South America label the following features:

- Equator, Tropics of Cancer and Capricorn, Atlantic Ocean, Pacific Ocean, Andes Mountains.
- Using an atlas to help you, add in the general position of biomes and any ocean currents along the Pacific Coast.
- Label Peru, Chile, Bolivia, Argentina, Ecuador, Colombia, Paraguay, Brazil and Venezuela.

Describe the location of Peru:

Which two main vegetation types are found in Peru? Suggest reasons for their location?

Take a look at the maps, images and data of pages 78–80 of the Student Book and use them to fill out the boxes below. You can also find images and maps on the Internet and stick them on this page to illustrate your text.

The Problem

(factors causing physical/economic water scarcity – refer to map in Student Book):

Actions:

The Consequences

(social, economic, environmental):

Many of the rivers in Peru are fed from glaciers from ice caps high in the Andes.

- Describe what has happened to the Qori Kalis glacier since 1978 (see Student Book page 81). Why is this happening?**

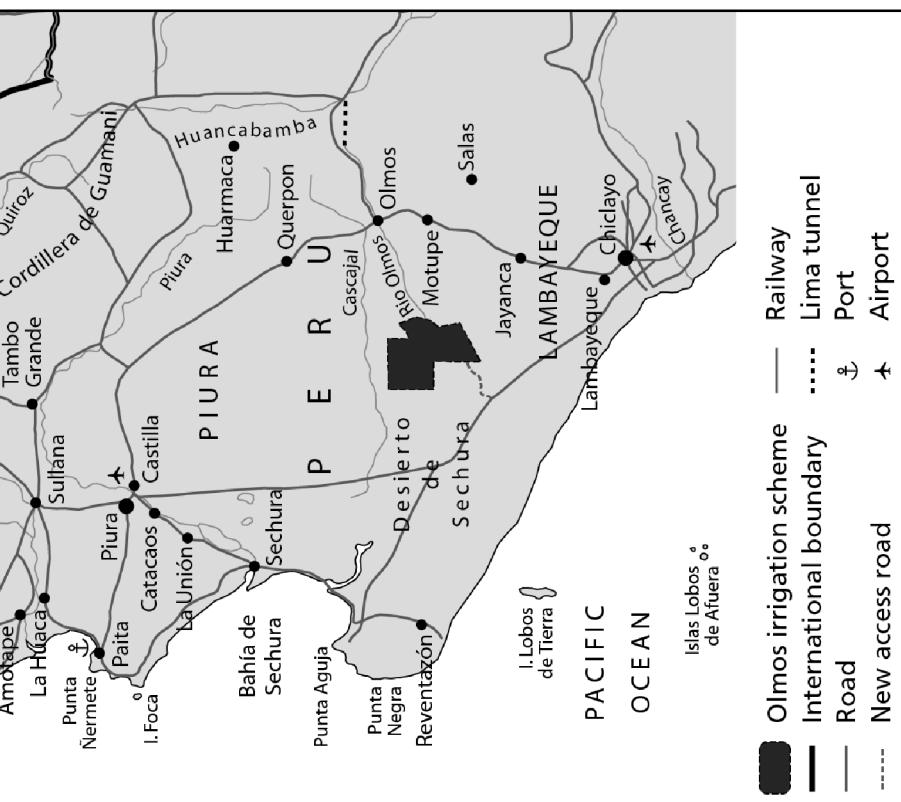
- How might this impact the situation in Lima?**

Peer Assessment Sheet: Why is Marisa catching fog?

Are these conventions included?				Choose one of the conventions which is missing, or you feel could be improved. Write down your ideas below on how and where in the text it might be included or improved.
	Yes	No	If yes, draw a numbered arrow to show an example in the text.	
1 The introductory paragraph sets the scene and provides background information.			Arrow 1	
2 Each paragraph begins with a topic sentence which introduces what it is going to focus on.			Arrow 2	
3 Maps, diagrams and photographs are used selectively and provide additional information to that which is written in the text.			Arrow 3	
4 Headings, subheadings and bullet points are used to divide the text into clear sections to assist the reader.			Arrow 4	
5 Written in the third person.			Arrow 5	
6 Written in the present tense.			Arrow 6	
7 Use of active voice, e.g. Geographers believe that ...			Arrow 7	
8 Effective use of connectives to show cause and effect.			Arrow 8	
9 Use of appropriate and specialised subject vocabulary.			Arrow 9	
10 Plain and impersonal writing to ensure that the explanation is clear and concise.			Arrow 10	
11 In the final paragraph the issue is summarised clearly and a conclusion reached.			Arrow 11	

Use the map below to analyse the decisions made to locate the irrigation project in this region of Peru and the impact that it might have.

Olmos irrigation scheme detail:



What human and physical factors led to the decision to locate the irrigation project here?

Will this benefit Marisa Sanchez and her children?

Can economic development on Borneo be sustainable?

► Purpose ◀

The purpose of this enquiry to explore the issues surrounding economic development on the island of Borneo and the impact this is having on both biodiversity and the indigenous people. A key part of this enquiry is the judgement on whether the current rate and type of economic development is sustainable.

The enquiry begins by exploring the concept of sustainability, in order for the pupils to develop their decision-making skills in terms of making judgements about how sustainable an activity is or is not. Pupils are presented with a range of facts and graphs to consider, as well as a definition of sustainability and an example of unsustainable activity. Pupils are then asked to make a mind map around the theme of how humans are impacting the planet, in order to draw out their prior knowledge and understanding. This is a good opportunity to encourage collaboration, with students sharing their ideas and adding to mind maps. This activity then leads to the pupils making simple judgements about whether exemplar human activities are sustainable or unsustainable. There are further examples included in this chapter, as well as space for pupils to give justification for their choices. Key to this first section is allowing the pupils to progress from the simple judgements to the much more complex reality. Pupils are encouraged to use the ‘stool of sustainability’ as a technique to assist in making judgements, as well as the development compass to focus their questioning about different activities. Having discussed the worked example of an open cast coal mine, allow the students to examine the picture of the Hoover Dam in Nevada. They should use the framework to analyse the image before making a judgement. It would be useful to show the pupils the dam on Google Earth, as well as Lake Mead. It is worth spending time to secure these skills by giving pairs of pupils alternative images of human activity from across the three books and asking them first to analyse, then present their image to the class. A peer assessment sheet is provided to focus the presentations. Ensure that you draw out the complexities of making judgements by showing that different activities can be considered both sustainable and unsustainable, depending on your perspective and time scale.

The pupils will be applying these skills further into this enquiry when looking in detail at the island of Borneo. Question 6.2 focuses on the island and asks what is special about this place? Pupils are presented with a huge variety of statistics, imagery, diagrams, maps and graphs across pages 92–99. Time should be spent examining these carefully and discussing what they show. The pupils are asked to produce an A3 poster on the island and its stunning landscapes and biodiversity. Students can use images from the downloadable Teacher resources or could find or draw images of their own. This activity could be done collaboratively using Google Docs or in the classroom with the base map provided.

Clearly, tropical rainforests on Borneo and in the Amazon have stunning and often unique biodiversity and play a vital role in providing humans with good as well as ecosystem services such as climate regulation, flood control and carbon storage. Question 6.3 asks pupils to consider what is happening globally to these forests before examining the situation on Borneo. Pupils will need to analyse the forest cover map from the Student Book using the framework provided on page 62 of the Teacher Book. Much forest loss is measured using remote sensing, so this question is an excellent opportunity to use GIS. A link is provided to a detailed Google Earth layer on forest loss in Sarawak. This should be downloaded and opened. There is a detailed help guide provided on pages 63 and 64 of the Teacher Book that give an example place to focus on. It is vital that pupils learn to switch layers of information on and off to see the patterns emerging and see how these layers relate to the actual aerial photography. They should be encouraged to take screenshots, which could then be annotated in a Word document.

A key driver of deforestation on Borneo is the development of palm oil plantations. In key question 6.4, pupils are asked to consider what is the invisible ingredient in deforestation? They are presented with a range of information about palm oil as well as a photo story showing the stages in production. Palm oil represents a key area of economic development for Malaysia and Indonesia, and is responsible for improving incomes for people across both countries, but for how long and at what cost? As consumers, we are buying products that contain cheap vegetable oil. This drives demand for palm oil and leads to deforestation, as plantations expand beyond the areas that were cleared in the past.

Are we, as consumers, responsible? Do we have a right to tell people to stop deforestation when it provides income and sends their children to school? Is this form of economic development sustainable? Are there alternatives? Pupils should be allowed to debate and discuss the complexities of these issues and undertake their own research prior to producing the text and images for the back of a cereal box for a company that uses sustainable palm oil. Pupils will have to draw on all the work from across this enquiry to demonstrate their understanding. Finally, pupils are given an opportunity to investigate how the Penan tribe are being impacted by deforestation and the attempts being made by NGOs at different scales to protect Borneo.

► Aims ◀

Through this enquiry, pupils will be challenged and supported to:

- Develop contextual knowledge of the location of globally significant places, including their defining physical and human geographical characteristics and how these provide a geographical context for understanding the actions of geographical processes.
- Understand the processes that give rise to key physical and human features of the world, how these are interdependent and how they bring about spatial variation and change over time.
- Interpret a range of sources of geographical information about physical and human processes, including maps, diagrams, aerial photographs and Geographical Information Systems (GIS).

► Links to Key Stage 3 subject content ◀

Pupils should be taught to:

Locational knowledge

- Extend their locational knowledge and deepen spatial awareness of the world's countries using maps of the world to focus on Asia.

Place knowledge

- Understand geographical similarities, differences and links between places through the study of human and physical geography of a region within Asia.

Human and physical geography

- Understand through the use of detailed place-based exemplars at a variety of scales the key processes in:
 - Physical geography relating to tectonic processes.
 - Human geography relating to economic activity and the use of natural resources.
- Understand how human and physical processes interact to influence, and change landscapes and environments and the climate and how human activity relies on effective functioning of natural systems

Geographical skills and fieldwork

- Interpret topographical and thematic mapping, and aerial and satellite photographs.
- Use Geographical Information Systems (GIS) to view, analyse and interpret places and data.

► Possible assessable outcomes ◀

Knowledge and understanding of the concept of sustainability could be assessed from the analysis and presentation exercise. The use of GIS could form the basis of an assessed piece that focuses on skills as well as understanding of patterns of deforestation. Finally, the cereal box exercise could be assessed for the ability to demonstrate knowledge and understanding of sustainability and the causes and impacts of deforestation, as well as the potential solutions.

For each example activity below:

- 1 Say whether you think it is **sustainable** or **unsustainable**.
- 2 Say **why** you think this.

Activity	Unsustainable?	Sustainable?	Reason for my choice:
Using cars to make short journeys rather than walking.			
Leaving the lights on all day.			
Having a short shower instead of a bath.			
Burying all our waste in a landfill site.			
Buying the same food all year round from all over the world			
Using wind power to generate all our electricity.			
Building thousands of new houses on a flood plain.			
Example:			
Example:			

Look at the image you have been given. Decide 'Is this activity sustainable or unsustainable?' What was your group decision? Explain why you reached this decision.

Describe what is happening in your image.

On the left of the paper, write down all the things that might be sustainable about this activity:

On the right of the paper, write down all the things that might be unsustainable about this activity:

Write down a list of questions that you would like to ask about this image. Use the development compass overleaf to help you think of at least four questions.

Assessment sheet

Give a score out of 10. Give max 5 for understanding of image, max 5 for quality of presentation



What is happening to tropical rainforests?

Use the guidance from the Student Book (p.98) to analyse the loss of forest. An example has been completed below:

Forest loss up to 1900: The vast majority of Borneo was covered in forest up to the year 1900. The main area of forest loss was in South Kalimantan, Indonesia, around the town of Banjarmasin on the South Coast. The area was approximately $100 \times 100\text{km}$ in size.

Forest loss from 1950–2000:

Forest loss from 2000–2020:

Total projected forest cover in 2020:

Using a basic Geographical Information System (GIS)

Geographers use a range of maps and data to view and understand patterns and processes in relation to different places at different scales. A digital map can be used to add different layers of information to see how the information links to the place and how it is changing over time. Google Earth is an example of a GIS. It is very easy to use and once you have found your house, you can begin to add layers of information that are built in, download layers from the Internet or even make your own. This user guide will show you how to access the layer of information on forest loss in Sarawak, Malaysia.

- First make sure you have downloaded and installed Google Earth:
http://www.google.co.uk/intl/en_uk/earth/
- For this exercise, it will work best on a Mac or a PC with a mouse.
- Open Google Earth and explore the basic functions. You can use this link for help:
http://www.google.co.uk/intl/en_uk/earth/learn/beginner.html
- Download the forest loss information layer (or KMZ file):
http://earth.sarvision.nl/Sarawak_forest_change_2005-2010.kmz
- Save and then open the file by double clicking on it. It will open Google Earth automatically.

You should use the navigation help guide on the next page to explore this layer. You are able to switch on and off layers of information that relate to the forest loss between 2005 and 2010, the location of oil palm plantations, parks and reserves and areas of peat. Peat is made of very old decomposing vegetation and is a vital store of carbon dioxide. This CO₂ can be released by deforestation and by the burning of forest to make way for oil palm plantations.

To help you navigate these layers try these tasks:

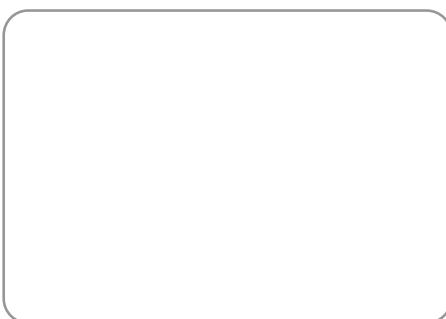
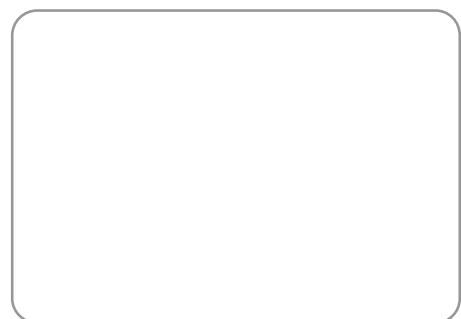
- 1 Zoom out to see the whole of Sarawak. Switch on and off the layers that show the peat areas. Repeat this for oil palm areas and the parks. Can you see any patterns emerging? Where is the recent deforestation happening?
- 2 The oil palm layer shows areas licensed for production, but not always deforested yet. Can you see any places where new forest may be destroyed to make way for oil palm? Hint: you are looking for peach colours (oil palm areas) on top of green areas (forest).
- 3 There is much more to see when we zoom in. Search for Pusa, Sarawak in the search box and zoom in. Again, toggle the layers on and off. The area to the north has very recent deforestation on peat areas, with more to come in the future.
- 4 Switch the whole ‘Sarawak forest change’ layer off and you will see the actual satellite image. Zoom in as close as possible with the image still clear. Can you find a dividing line, where the oil palm ends and the forest begins? Switch the oil palm layer on. What will happen here in the future?
- 5 You could drop a place mark here to save the location. See:
http://www.google.co.uk/intl/en_uk/earth/learn/beginner.html#tab=placemarks-and-tours
- 6 You could even switch on historical imagery and use the slider to see any change over time. You should repeat this exercise by exploring and finding different locations where there is evidence of change, dropping place marks and taking screenshots as you go. Note: the historical imagery is patchy. Why do you think this is?



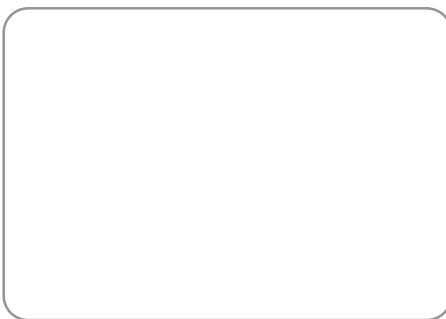
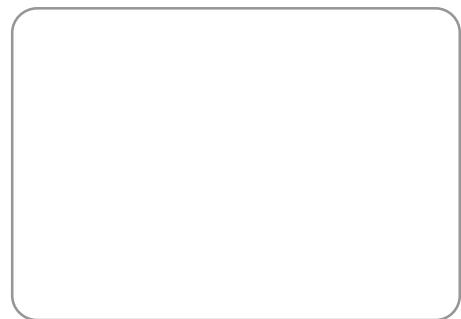
From forest to factory storyboard

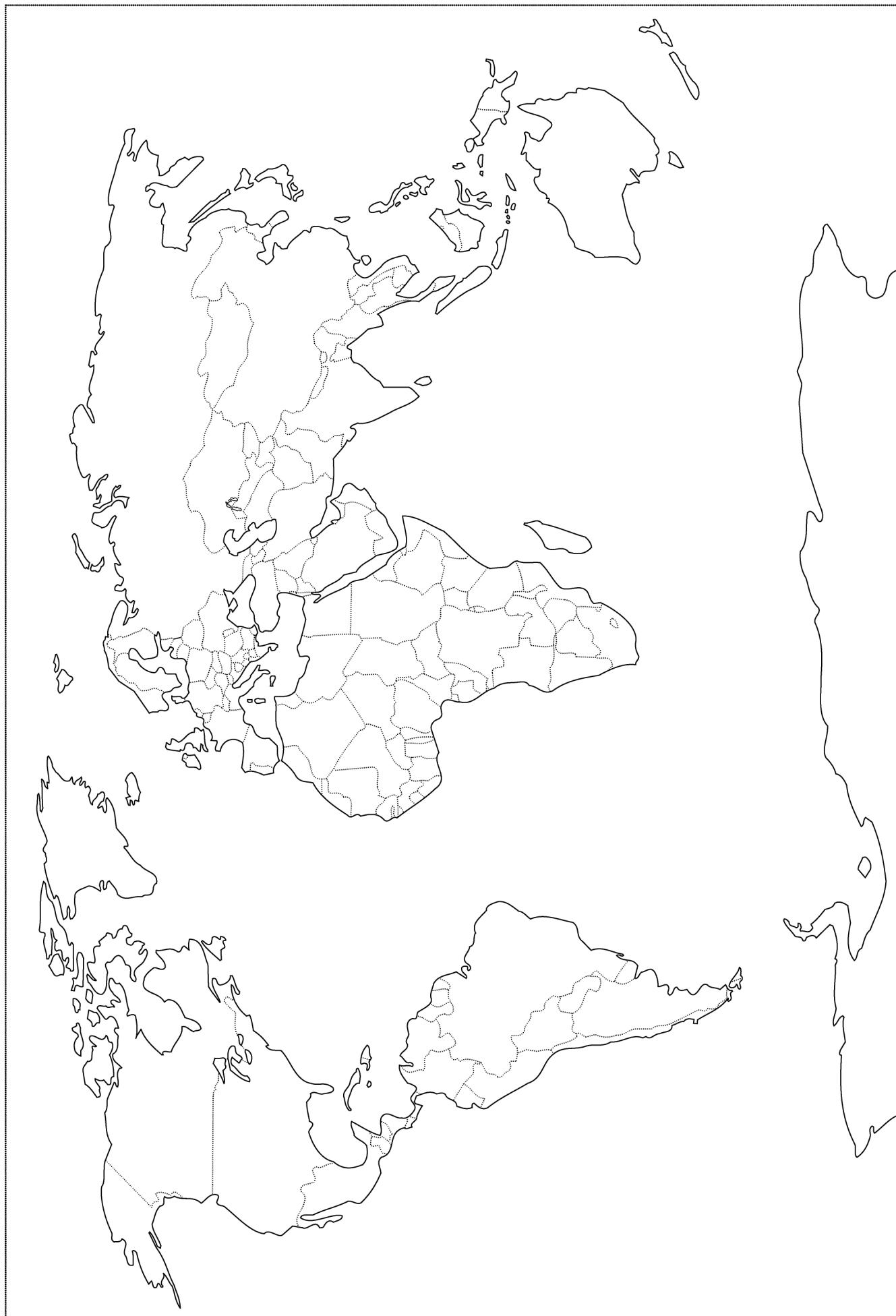
Enquiry Support Materials

Use the template below to storyboard the journey of palm oil from the forest to the factory









Teachers: add instructions for your own use.



Teachers: add instructions for your own use.



Teachers: add instructions for your own use.



Teachers: add instructions for your own use.



Teachers: add instructions for your own use.



Teachers: add instructions for your own use.



Teachers: add instructions for your own use.